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USSR Report

CONSTRUCTION AND RELATED INDUSTRIES

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CONSTRUCTION PLANNING AND ECONOMICS

CAPITAL INVESTMENT PAYS OFF FOR UKRAINIAN INDUSTRY

Kiev PRAVDA UKRAINY in Russian 6 Dec 84 p 2

[Article by N. Gordiyenko, head of the economic section, Dnepropetrovsk Obkom, Ukrainian Communist Party: "A Certificate of Effectiveness--Technical Progress: The Yield on the Scientific Search"]

> [Text] Much has been done in our country to create a strong material-technical base for all sectors. Today, when we have at our disposal a huge economic potential, questions of the maximally effective application of available capacities and overall increase in the labor productivity of each worker become the order of the day. This goal may be achieved no better than through the experience of the Dnepropetrovsk combine builders on work station certification, which was recently approved by our party's Central Committee. Comrade K. U. Chernenko, speaking at a meeting of the CPSU Central Committee Politburo which examined the tasks for 1985, stressed the need for ministries and local party, Soviet and professional union organs to comprehensively provide for the promulgation of this important endeavor. This is applicable in full measure also to the communists and all workers of Dnepropetrovsk, who have worked fruitfully and continue to work in this direction.

The value and significance of any endeavor is greater with a greater number of people and collectives supporting it. Keeping this fact in mind, the Dnepropetrovsk Obkom of the Ukrainian Communist Party has worked out specific measures for the certification of work sites at all enterprises within the oblast. These measures have been thoroughly coordinated with already implemented regional integrated programs "Brigada" [Brigade] and "Trud" [Labor]. At the proposal of the UkSSR Academy of Sciences Pre-Dnieper Scientific Center, the integrated target program "Kachestvo" [Quality] was also developed. Thus, the certification of work stations has been organically intertwined into the extensive and multifaceted work which is being performed by the oblast party organization on the successful fulfillment of tasks outlined by the 26th CPSU Congress.

It is clear that the key to success here lies primarily in party management and strict control over the implementation of all the outlined measures. It

is specifically this line which the Ukrainian Communist Party Dnepropetrovsk Gorkom is clearly implementing. As early as March of last year, the experience of combine builders was approved at a meeting of the gorkom bureau. A month later, a seminar of party workers and economic managers of plants and factories of the oblast center was held at the combine plant. Later, specialists from numerous enterprises came here to become acquainted in detail with the methodology of work station certification. These specialists comprised the framework of plant and shop certification commissions and coordinating groups.

Today, base enterprises have been named in every sector represented in the oblast, where certification experience has already been accumulated. They have become the centers for promulgating initiative of combine builders as applicable to, say, the specific conditions of ferrous metallurgy, the food industry, and so forth. Scientists have given great help to the production collectives in this complex operation. For example, the department of economics and organization of production at the state university has developed scientific-methodological recommendations for compilation of intensive plans for shops, sectors and brigades with consideration for the normative capacity of the technological equipment. In turn, the scientists of the metallurgical institute have worked out sectorial methodological directives for plan compilation on technical retooling and evaluation of the technical-economic level of production of metallurgical plants. The application of these outlines will make it possible to realize a significant growth in production capacities.

However, it is no less important to draw the need for immediate implementation of work station certification to the attention of the workers and to mobilize the engineering-technical personnel to the fulfillment of these tasks. The party and professional union organizations have performed extensive educational work in the labor collectives. The results were seen immediately. Thus, a milling machine operator at the Dnepropetrovsk Machine Tool Building Plant, N. S. Marchenko, proposed a scheme of equipment reorganization which allowed him to service eight machine tools instead of the four which he previously serviced. At the Verkhnedneprovskiy Starch Hydrolysis Combine there were 145 proposals for improving work stations submitted in the first half of this year alone. As a result, 62 people were liberated for other jobs, as well as 38 units of equipment. The economic effect in this case alone comprised 105,000 rubles.

Here is a characteristic fact from the practical experience of the Dnepropetrovsk Radio Plant. The party group headed by N. I. Plakhotnikov submitted the following proposal: to create individual work stations and a mechanized adjustment section instead of the conveyer method of television set adjustment. As a result, 18 people will be liberated, while labor production will increase by 2 percent. In the course of certification based on the proposals of communists at this shop, 30 people were liberated. We will note that this made it possible to organize a new section in production within the framework of the former number of workers.

Among the collectives actively performing work station certification we must especially note the Southern Machine Building Plant Association, the Dnepropetrovsk Machine Building, Aggregate, Machine Tool Building, Shaft Automation, Pipe Rolling imeni V. I. Lenin, and other plants. Here certification commissions

are operating in a persistent and goal-oriented manner and measures have been developed for moral and material incentives for better results in this sector. A number of interesting innovations have arisen in the course of this work. For example, at the Dneprovskiy Machine Building Plant a mandatory certification of technological processes has been introduced. It has facilitated the identification of the most improved methods of manufacturing assemblies and parts, the application of the most current methods and means of control, and the improvement in the quality of manufactured production. Things went even farther at the combine plant itself. Today at the enterprise there is certification not only of the work stations, but preparations are also being made for the certification of brigades and technological processes, which undoubtedly will ensure higher end results.

If we speak of the results of the first stage of this work throughout the oblast as a whole, for the present day half of the work stations have been certified at our enterprises, over 3,000 workers have been liberated and transferred to other operations, and over 2,000 units of equipment have been excluded from production. Aside from the direct benefit from its realization, this has yielded additional profits at the expense of reducing payments for fixed capital and reducing expenditures for maintenance of unneeded machine tools. The economic effect has comprised over 20 million rubles.

However, behind the economic effect we must also see the social aspect. Thus, at the Metallurgical Plant imeni Komintern thanks to the improvement in working conditions in the course of certification, the worker turnover dropped from 5.9 to 4.2 percent in the current year. At a paint and lacquer plant certification made it possible to improve working conditions for over 300 workers... Computations show that in the current year alone, the labor of 22,000 workers will be mechanized thanks to introduction of the experience gained by the combine builders, as well as the realization of the regional integrated-target program "Trud". At the same time, the elimination of 5,000 outdated work stations will make it possible at numerous enterprises to at least notably reduce the demand for workers if not to solve the personnel problem altogether.

All that we have said does not mean, of course, that all the difficulties are now behind us. As in any new undertaking, there is enough of them. Thus, significant difficulties have arisen at the Pridneprovskaya GRES [State Regional Electric Power Station]. These were determined by the peculiarities in the structure of production, as well as by the fact that there is no exact qualification of work stations in the power industry. Analogous problems exist in ferrous metallurgy and at enterprises within other sectors. In connection with this, the ministries and their workers must devote greater attention to such questions. After all, the development of normative documents for performing inventorization and then certification of work stations, and the implementation of methodological management of this work--this is their direct concern. As they say, there is still no end to the work here.

There is also the problem of realization of the equipment which has been freed in the course of the certification. At the present time, almost 2 million rubles worth of such equipment has accumulated in Dnepropetrovsk alone. In our opinion, the accelerated creation of a centralized system of informing republic enterprises about the presence of available equipment which should be placed into operation as soon as possible would be very helpful here.

Work station certification has made it possible to bring new production reserves into operation, to resolve a number of social questions by means of improving working conditions, and to balance the number of work stations and the available labor resources. The equipment shift applicability coefficient has increased and return on capital has risen. Thus, all the prerequisites have been created for successful fulfillment of the plans for the current five-year plan and for realization of the tasks presented in the speech of comrade K. U. Chernenko at the recent meeting of the CPSU Central Committee Politburo.

12322
CSO: 1821/103

HOUSING CONSTRUCTION

NEW SINGLE UNIT RURAL HOUSING EXAMINED

Moscow NA STROYKAKH ROSSII in Russian No 11, Nov 84 pp 22-25

[Article by G. Rakitin, chief of the Orlovskiy Oblispolkom Construction and Architectural Affairs Department, and Ya. Kagan, chief engineer of the Orlovskiy Badge of Honor Construction Administration, of USSR Minpromstroy [Ministry of Industrial Construction],:"The Reconstruction of the Orlovskiy Oblast's Rural Population Centers", under the rubrics, "Urban Construction Workers--to the Toilers of the RSFSR's Non-Chernozem Zone Settlements" and, in a box, "Reconstruction of the Orlovskiy Settlement", "Design Determined for Rural Settlements Under Construction", "Erection of New Housing With Simultaneous Reconstruction of Existing Housing", "The Plan for Increasing the Share of Farmstead Construction", "New Economical Rural Housing Plans Developed by the Orelgiprogorsel'stroy [possibly Orel State Urban and Rural Construction Planning Institute]"]

[Text] At the present time, in the Orlovskiy area, as well as in other oblasts of the RSFSR's Non-Black Earth Zone, widespread renovation of rural populated areas has developed. The rebuilding rates of the Orlovskiy Settlement have increased year in and year out.

The amount of the capital investments for residential and cultural-domestic service construction, which amount has increased more than 2-fold in comparison to the corresponding capital investments for the 10th Five-Year Plan, attest to the scope of the effort which has begun in the oblast. The task has been set to put into use in the 11th Five-Year Plan a million m^2 exclusively for housing, and to build hundreds of kindergartens, schools and clubs.

At present in the oblast we count 411 kolkhozes and sovkhozes and about 3,400 populated areas, approximately 70 percent of which have populations of up to 100 people. When the question of rebuilding them came up, there arose a wide variety of problems, among them economic problems, problems of production, and ecological, engineering, and architectural and artistic problems. For example, which population points were to be developed and rebuilt during the first phase, what should be done about the sparsely populated villages, what was to be the style of the dwellings, was was to be the level of public services and amenities and engineering equipment for a village, how was existing housing to be renovated so as to provide comfortable living conditions in the same degree for old houses as for new?

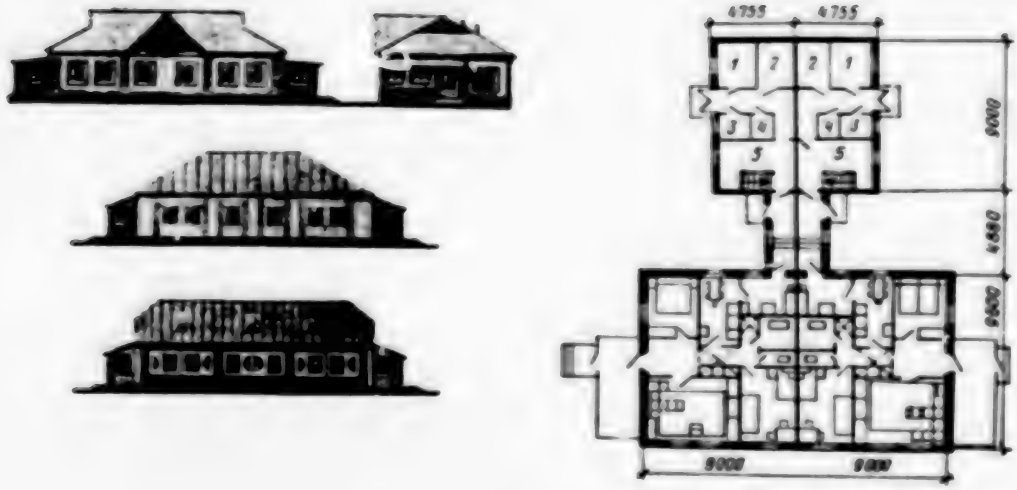
Various designs for a single-family three-room farmhouse with poured-in-situ walls. On the right--house and farm block floor plan: 1--Poultry coop; 2--Stall for cow and calf; 3--Space for swine with litter; 4--Storeroom; 5--Garage.

As a result of studying the settlement system, plans for the socio-economic development of farms, and plans for the regional layout of administrative areas for the immediate development of rural population centers, 411 central farms and about 600 villages have been specified as brigade and departmental centers.

A structure has been decided upon for rural settlement construction, by which it is stipulated that up to 20 percent of the new housing will be sectional houses, and 80 percent will be farmstead-type houses. This build-up of the oblast's villages is being carried out in two directions: with 2- and 3-story sectional houses which are equipped with all types of municipal services, and farmstead-type houses. In this connection, it has been decided to implement an integrated solution to the problem, i.e., new houses will be built while existing housing is renovated.

In present-day rural construction, it has been decided to increase the amount of farmstead-type construction, which will create conditions conducive to rural life, and which take the peasant mode of life into account.

At the same time, farmstead construction requires large capital investments compared to the construction of sectional homes. A comparative analysis of the cost of 1 m^2 of total housing space shows that farmhouses are 35-40 percent more costly than sectional houses. An investigation of the cost of farm-type housing, considering construction outlays for engineering networks, roads and public services and amenities has shown that the cost of 1 m^2 of usable area of farm-type housing has increased by 60-70 percent in comparison to sectional housing.



Variations of the semi-detached two-family three-room farmstead home, with poured-in-situ walls. Right--Floor plan of house and farm block: 1--Cattle stall; 2--Swine shed; 3--Poultry coop; 4--Storage for implements; 5--Storeroom.

That is why, in view of the sharp increase in the proportion of farmstead-type homes, the task of lowering the cost of rural residential construction has taken on such urgency.

And here, in addition to the improvement of the volume planning and design decisions of the buildings, an important role is played in making the selection of the optimal planning decisions for locating the construction project, its architectural layout and its volume and spatial organization, with regard to the national architectural traditions, to natural and climatic factors, the locale's topography, the geological engineering and hydrological qualities of the area, the established building up and so forth.

Taking all these factors into consideration, Orelgiprogorsel'stroy has developed a variety of serie.-produced individual single- and double-family rural farmstead-type homes based on 1-, 2-, 3- and 4-room floorplans in a block system with their farm need accomodations, and with all forms of engineering equipment and residential public services and amenities.

In this connection, the designers are basing their designs on the maximum utilization of local construction materials and the available productive capacities of the house-building enterprises and the construction industry.

A study was made of the most practical and convenient, (and, in the Orlovskiy area, historically established) methods of arranging and organizing the interior space, the arrangement and dimensions of the farm-use rooms and rural farm-

stead structures, all of which provide excellent conditions for long-term residence and for tending one's personal subsidiary plot.

These local traditional methods for designing rural farmsteads were used as the basis upon which to develop a new kind of house, where the farm-use rooms are arranged in a single block with the dwelling, and the yard space is used primarily as a continuation of the dwelling, with consideration being made for the combined design solution of the farmstead area as a whole.

As part of this series of homes, several types of facades, foundations, walls, ceilings and floors were developed. Thus, along with the basic shallow foundations, there are variations of the different types of pile-driven foundations; in addition to walls of brick and large series 111-121 and 25 panels, provision has been made for poured-in-situ walls of expanded-clay lightweight concrete; the floor design calls for chipboard sheets laid on the floor joists, and also along the socle closure; finally, several hip roof variations have been produced. Cellars have been provided for storage of agricultural products, and these have been made part of the farm-use structures.

The use of progressive and economic resolutions in these plans allows a marked improvement in the dwelling's comfort factor, and a 10-15 percent reduction in construction costs and material resource outlays compared to the standard plans. In this connection, the construction of rationally laid out duplexes reduces construction costs by about 15 percent, compared to single-family houses.

The houses have been standardized. Within the series the windows, doors, the farm-use structure blocks and various other design elements have been standardized. However, by using varying roofs and facades, and different layouts for the houses and their attachments on the house site, 18 different structural silhouettes can be achieved, all based on a single home plan.

(A) Конструктивный тип одноквартирного 3-комнатного дома	(B) Приведенная общая площадь, м²	(C) Сметная стоимость, тыс. руб.	(D) Стоимость 1 м² приведенной площади, руб.	(E) Расход металла, кг	(F) Трудоемкость, чел.-дн.		
					1 заводская	2 на строительной площадке	3 общая
1 Сборный серии 121 У-121-1-3/3	82.68	21.5	260	1870	43	380	423
2 Кирпичный УК-1-3/6	88.98	20.1	227	700	22	470	492
3 Монолитный УМ-1-3/1	82.60	19.2	230	1550	18	404	422

Construction and cost figures for new single unit rural housing

Key: (A)--Structural type, single unit three-room house, 1--121 U-121-1-3/3 prefabricated; 2--UK-1-3/6 masonry; 3--UM-1-3/1 poured in-situ concrete; (B)--Added total space, m^2; (C)--Estimated cost, 1000's rubles; (D)--Cost per 1 m^2 of added space, rubles; (E)--Metal outlays, kg; (F)--Labor outlays, man-days; (F1)--At the plant; (F2)--At the construction site; (F3)--Total

Requirements for saving heat have also been taken into consideration through rational installation of the socle skirt, maximum use of the block arrangement, organizing the homes' entryways only through vestibules or verandahs, elimination of large-area windows, the use of thermal joint construction in panelled homes, as well as thermal liners in wall panels, and finally, by using expanded-clay lightweight concrete walls.

Poured in situ concrete farmstead houses under construction in the village of Vorotyntsevo, Novosilskiy Rayon, Orlovskaya Oblast.

We find the installation of the poured-in-situ expanded-clay lightweight concrete walls most interesting. Constructing the walls for a single unit three-room farmstead house using poured-in-situ expanded-clay lightweight concrete is 26 percent less costly than completely precast walls, and 17 percent less than masonry walls, with regard to outlays plus interest.

The Orlovskiy Construction Administration's Orgtekhstroy Trust has drawn up drawings for a standardized unitized large-panel travelling formwork for concreting exterior and interior bearing walls, instructions for its use, and a plan for carrying out the work.

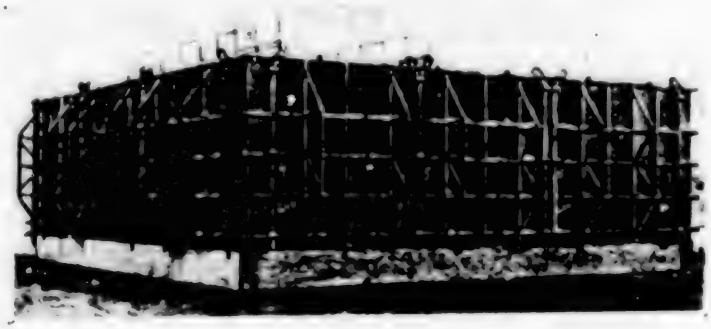
Using one of these standardized travelling forms when erecting the walls of a three-room house, all 18 structural silhouettes can be produced. The use of angled inserts and preconcreting faceplates [dobornyy shchit] permits the construction of house walls having straight or rounded exterior corners, and variations in the decorative elements of the window openings and the outside wall facades, which considerably expands the opportunities to use a given house, and eliminates structural monotony.

In the installation of the exterior walls, a 5-man brigade takes two shifts to set up the formwork, the concreting takes one shift and dismantling the formwork takes 1.4 shifts. The total labor-intensiveness for constructing the poured-in-situ walls for a single-family three-room house amounts to about 40 man-days.

Houses built with poured-in-situ walls are the most economical and least labor intensive (see Table).

In order to check the architectural and artistic qualities of the construction in progress, the economic effectiveness of the layout decisions, the house models and the methods used to organize the construction, the Orlovskiy Construction Administration, (in addition to building other settlements), is building a central farmstead for the Novosilskiy Rayon's Shenskiy Sovkhoz, in the village of Vojrotyntsevo. The plan for the first phase of construction includes 29 single- and double-unit farmstead style houses, two large-panel three-story, 36-apartment sectional houses, a kindergarten for 90 children, a trade center and a number of other facilities. The settlement has been provided with complete engineering equipment, including central heating and boiler-room-supplied hot water, running water, a sewage system, and an electric power supply.

In addition to the new construction being carried out by the direct labor method, existing houses are being renovated and connected to the engineering networks which have already been constructed.



Large-panel formwork for poured-in-situ farmstead house.

Analysis of the cost indicators for the farmstead-style houses now being built in the Shenskiy and Pavlovskiy sovkhozes and the imeni Kalinin Kolkhoz are proof that the cost for 1 m^2 of total calculated area, with all the outlays for housing construction varies from 437 to 687 rubles. In this connection, in houses built in conjunction with farm-use structures, taking local tie-ins into consideration, the cost for 1 m^2 of area has remained almost constantly within the 214-260 ruble range.

This suggests that the cost for a m^2 of given area depends by and large on the proportionate value of the overall outlays for the house, since all the expenditures for ongoing construction in a population center form, for all practical purposes, the cost of the housing under construction, and at the same time, as it is handled in cities, the outlays for 1 m^2 of living space form only a quarter of the amount for ongoing construction and the rest, as a rule, fall within the municipal outlays.

The planning and provision of public services and amenities for a settlement, and especially for farmstead-type houses, require massive capital outlays. In the plans for these houses which have been developed by Orelgiprogorsel'-stroy, provision has been made essentially for tying in centralized engineering equipment: heating--both of water and central heating, and less often, apartment heating via various types of stoves; water is provided from a centralized community system, and farm and domestic sewage removal is handled by the community system.

The choice of the types of engineering equipment systems depends on a lot of factors, but the centralized systems get preference only when an entire settlement is being rebuilt, or during the one-time construction of a large number of houses.

The long, drawn-out time periods used in housing construction, as well as its patchy nature, have necessitated the development of autonomous utility systems. Where the heat-supply system is not centralized, apartment-size heat generators are used for heating water, for room heating and for cooking.

Where a group of houses is erected, small-scale sewage purification works are installed, consisting of a sand and gravel filter septic tank, which will meet domestic needs for 5-8 years.

In water supply system designs, preference is given to centralized systems, as they are technically more economical, reliable and sanitary. They are also more effective for fire control than autonomous systems.

The ongoing construction of the oblast's settlements is being done by USSR Minpromstroy's Orlovskiy TUS, RSFSR Minsel'stroy's [Ministry of Rural Construction] Orelsel'stroy Trust, and the Oblkolkhozstroy [Oblast Kolkhoz Construction] Association, of Roskolkhozstroyob"yedineniya [possibly Great Russian Kolkhoz Construction Association], with the assistance of kolkhozes and sovkhozes (direct labor method), and industrial enterprises from the city of Orel (inter-organizational patronage assistance).

The houses are being built using a directional [direktivnyy] time-table, which is approved by the Orlovskiy oblispolkom for each year of construction. These time-tables are developed on the basis of the Five-Year Plan for Rural House-Building, and are broken down by organization and year.

For construction and installation work to be done according to plan and by the industrial flow-line methods, and to put facilities into operation by established deadlines, with high technical and economic indicators and top quality work, Orgetkhstroy, of the Orlovskiy TUS has developed an integrated program for organizing flow-line rural housing construction, which has been approved by the USSR Gosstroy [State Committee for Construction Affairs] Scientific and Technical Council.

The daily transport of workers to the worksite (on economic grounds and taking local conditions into account) is done for distances to the work area of up to 45 km, and for distances of over 45 km, the work is organized by the shift method, with workers housed in on-hand mobile dormitories or in the first sectional houses to be built.

In order to carry out the ever-increasing volumes of work in the settlement, flow lines have been organized in our construction organizations which are specialized in the construction of farmstead-type houses, sectional precast, masonry, and houses with walls of poured in situ expanded-clay lightweight concrete. The flow-lines are equipped with a standard complement of mechanisms, equipment and tools.

However, it should be mentioned that the construction of social, cultural and domestic facilities in the settlement is behind schedule. The available standard plans for schools, kindergartens and trade enterprises and domestic services often do not satisfy the requirements made of them: their capacities far exceed the requirements of the population center, they are inadequately industrialized, and they far from completely take the specific nature of the rural area into account. That is why efforts are now being made in the oblast to use sectional and farmstead-style houses to accomodate some of the population's domestic services enterprises.

12659
CSO: 1821/049

CONSTRUCTION MACHINERY AND EQUIPMENT

ROBOTS TO INCREASE PRODUCTIVITY IN CONSTRUCTION SECTOR

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 9, Sep 84 pp 79-81

[Article by Yu. Yakovlev, lecturer and candidate of economic sciences (Kherson): "The Robotization of Construction Operations"]

[Text] Industrial robots and manipulators that perform heavy and monotonous operations will have an important role in the system for equipping labor in the near future. They signify a qualitatively new stage in developing production technology and automation, raising labor productivity and quality considerably, and facilitating conditions for introducing two- and three-shift work. Thousands of robots are now operating in various branches of the national economy and their use is expanding rapidly.

Robots must and can be introduced into construction work, where labor productivity is rising very slowly. It grew 11 percent in Ukrainian SSR construction work during the 10th Five-Year Plan, 3.3 percent during the first 2 years of the current five-year plan. Rural-construction workers are experiencing special difficulties. Ukrmezhkolkhozstroy [Ukrainian Trust for the Construction of Interkolkhoz Facilities] is not meeting plans for labor productivity growth, and UkSSR Minsel'stroy [Ministry of Rural Construction] has fallen even below the 1980 level.

The builders have achieved good results in mechanizing various types of work. Thus, in 1982 Ukrmezhkolkhozstroy mechanized earthmoving by 93.9 percent, the mining and processing of quarried building materials by 98.5 percent, and the erection of concrete and reinforced-concrete structure by 99.7 percent. Fully prefabricated construction reached the 52-percent level for UkSSR Ministry of Rural Construction as a whole. In 1982, in rural construction, the main contracting construction organizations had more than doubled the estimated number of basic construction machines per 100 workers over 1970. The number of mobile plastering and painting stations and small-machinery units has risen substantially. Specialized construction organizations engaged in earthmoving and road-building work are using machinery equipped with automated control systems, such as, for example, Stabiloplan for graders and Stabilosloy for asphalt layers.

The introduction of manipulators--devices that the operator controls remotely in the programed operation of implements that simulate the functions of the human arm in the erection of prefabricated members, in loading and

unloading work, and in the manufacture of constructional structure--is promising. More complicated devices--industrial robots that automatically operate machines that perform technological operations--should find application in plastering and painting work and in waterproofing operations at building-materials and construction-industry enterprises.

A rather large range of robots has now been created that can be used also in construction operations. The matter of breakdown-free operating equipment that is involved in mechanization, without which robots cannot be applied to manual technological operations, is more complicated. Regional centers for applying robots to manufacturing processes are introducing their developments in various branches of industry and farm machinery, while only construction has not been given attention, although the operating processes here are not complicated, comparatively speaking. The successful introduction of robots into construction operations processes requires primarily improved organization and overcoming of the psychological barrier.

About 50 percent of construction workers (the highest percent in USSR Minsel'stroy is 59.3 percent) do manual work, the figures being 90.8 percent for masonry work, 68.8 percent for plastering, 73.3 percent for painting, 70.8 percent for electrical installing work and 63.2 percent for plumbing. While construction sites have been saturated with large mechanized equipment, its utilization has been reduced. For example, in 1982, utilization time within Ukrmezhkolkhozstroy was 81 percent of 1970's for excavators and 87 percent for truck cranes, and 38 percent for tower cranes in terms of finished output in kind. In UkSSR Minsel'stroy, worker manning per 1 million rubles of construction and installing work in 1982 was 115, while in Ukrmezhkolkhozstroy it was 79 and for construction as a whole 69.

According to photographic data on the workday, in 1982 idle time for machinery and mechanisms was 18.2 percent of the total number thereof because of the absence of materials, and 27.2 percent of it was caused by lack of a work front, much of which was caused by interruptions in materials supply, since, for example, ceiling-floors often cannot be erected because of walls that are unfinished owing to a lack of brick, and so on. Therefore, one of the essential factors in intensifying the utilization of large and small machinery at construction sites in terms of time and capacity is the restructuring and reequipping of construction-industry and building-materials bases for an increase in product output.

The effectiveness of this factor can be traced more strikingly in cooperative construction organizations, since they do more self-supplying of structure and materials. In determining the ratio of fixed industrial-production capital to funds for construction purposes, the higher this indicator, the higher the labor productivity at the building site. Thus in Crimean Oblmezhkolkhozstroy [Oblast Trust for Construction of Interkolkhoz Facilities] this ratio was 2.07 in 1982, while labor productivity in construction work was 7,483 rubles per worker per year, and in Nikolayev Oblmezhkolkhozstroy the figures were, respectively, 0.94 and 5,749 rubles. This consistency is also observed throughout other oblmezhkolkhozstroy's of the Southern Economic Region.

In considering that approaches to automating technological processes directly at the building site are basically only beginning to take shape by virtue of the complexity of the problems, while many operations can be transferred to fixed-plant conditions, it is desirable to devote attention precisely

to this factor, the solution of which can yield results more rapidly in the area of applying robots to construction. The more so because maximum use can be made of industry's experience and developments in introducing robots into production work.

An automated concrete plant is operating at Lvov, and the laying of raw material for bricks on the steaming carts during silicate brick production and the processes for manufacturing clay brick have been robotized at the Pobeda Building-Materials Production Association in Leningrad. As the industry's experience indicates, not only centralization of robot procurement but also the initiative of enterprises in regard to robot manufacture and installation will help to achieve rapid advances in introducing robots within a short time. Automatons for laying clay brick on the drying carts were developed and introduced at the Brest Building-Materials Combine in 1978-1979, in 1980 automatic machines for placing bundles of bricks on kiln carts were developed and introduced, creating the prerequisites for eliminating manual labor during the final brick-producing operation--transfer of the bricks from the kiln carts onto pallets for hauling.

Thus, means for automation have been developed for all the main clay-brick production operations, but of the 419 presses for producing clay brick that have been installed in the republic's industrial association, 126 have been equipped with automatons for laying bricks on the drying carts, that is, this operation has been automated by 30 percent. The labor-intensive manufacturing operations of setting bricks and laying them on pallets are being performed manually.

The logical continuation of brick-production automation is the output in the plant environment of large brick members for buildings. It is technically possible and economically desirable to organize the manufacture of brick modules and panels as an organic continuation of the technological strand of brick manufacture. At the Goloseyev Brick Plant in Kiev, the enterprise gets about 2 rubles of profit per cubic meter of output from the mechanized manufacture of modules.

Industry and construction have not undertaken the laying of brick in modules and panels, which is technically simpler for automation. This operation is at the juncture of two industries, and, as a rule, the problem is being resolved here in more complicated fashion, not for technical but for organizational reasons. A study of the problem has shown that the builders have been motivated to erect brick modules, provided that the building-materials industry manufactures them, which was done at one time. Unfortunately, brick-module pricing imperfections and other factors did not allow output to be expanded, and now it is practically shut down. The builders' attempts to organize the production of modules at their own casting yards did not prove to be economically desirable. Consequently, it is more reasonable for the organizational plan to solve the problem of consolidating members made of brick in the organizations that make the brick and do the construction and installing work, which, in the village, is the mezhkolkhozstroy. Incidentally, modules are being produced at the Goloseyev plant by organizations that manage brickmaking and construction and installing operations.

In 1982 the UkSSR building-materials industry produced 6.7 billion rubles of standard brick equivalent. In our country, about 50 percent of all buildings

are now being erected with brick. In Kherson Oblast, during the 10th Five-Year Plan, an average of 540,000 m^2 of living space was turned over for operation, 110,000 m^2 of it by the housing-construction combine. Thus, walls for 430,000 m^2 of living space were erected from small-piece members. It should be added that many industrial and agricultural buildings also are being erected with brick.

Brick is distinguished from many modern materials by high heat-resistance and sound-insulating qualities and an absence of subsidence and the menace of crack formation, and the possibility of erecting 15-story buildings with load-bearing walls made of brick has been proved in practice. At the same time, the building of walls with brick is done manually, often under unfavorable conditions.

Experience now available has shown that ceramic panels enable brick consumption to be reduced in comparison with brick walls made of ordinary masonry, the building's weight to be cut about in half, and its budget-estimated cost to be reduced. It is especially desirable to use these panels in rural construction, where the level of prefabrication of housing and nonproduction buildings is extremely low and labor consumption in masonry operations comprises about 50 percent of the labor-consumption structure.

Most suitable for erection from modules at present are low-rise apartment houses in the countryside. There is still, in essence, no industrialized base for manufacturing them. Organizing the production of modules and panels out of brick could resolve this problem. The automation of masonry work will yield a considerable economic benefit and improve the regularity of production, regardless of the time of day or seasonal conditions, the organization of two-shift work will be facilitated and the quality and sophistication of construction work will be raised.

There is one more problem that touches on robotizing masonry work: automation of the outside finish of modules and panels. Traditionally, the various types of facing tiles used are not an effective means. In the first place, as dissimilar materials with different coefficients of expansion that are caused by atmospheric phenomena, they separate from the wall; second, manufacturing them and attaching them to the wall are labor-intensive; and third, the materials-intensiveness of the facing is high. Paints have been rid of deficiencies, but they suffer from inadequate durability. The various types of plastering are unacceptable because of high labor consumption and the need for periodic repair. The most promising technological process in this regard is treatment of the facade portion of the modules and panels with low-temperature plasma, which is used at Ulyanovsk and Nizhnevartovsk. A thin layer of glasslike mass of the same material excludes all the deficiencies of the methods examined above, permits the color range to be regulated, and is not very energy consuming, and automated production of the finish of enclosure structure at the factory will enable high quality to be insured.

The experience of Riga's and Tallin's workers, who created special introductory organizations for developing and manufacturing the new equipment, will help in achieving considerable advances in robotizing construction work. Similar regional organizations can be created where there are large industrial enterprises of builders that have been mannedwith specialists in automating construction work. The creation of services for automating and the planning

of measures for this chapter of the social development plan will serve as an organizational basis for the wider introduction of automation into construction operations.

After identifying the more promising enterprises and organizing help for them within the region, experimental production for demonstrating the advantages of automating technological processes and the extension thereof to kindred enterprises can be created in a short time.

The effectiveness of automating technological processes in construction is manifested in the radical improvement of work organization alone. In its turn, the introduction of automatic devices will promote improvement of the collective's social climate. The elimination of monotonous manual operations, a rise in the vocation's prestige, and the improvement of hygienic conditions will lead to a reduction in personnel turnover, and this, together with a rise in the levels of qualifications and of wages and a reduction in violations of discipline, will stabilize the collective, promoting a substantial rise in labor productivity. A distinctive feature of automation is the possibility of transferring not only physical functions but also control functions to the machines proper and their processors.

11409
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CONSTRUCTION MACHINERY AND EQUIPMENT

METAL CONSUMPTION RATES IN TRACTOR, MACHINEBUILDING

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 11, Nov 84 pp 82-84

[Article by I. Ksenevich, chief of the Engineering Administration of Minsel'-khozmash [Ministry of Tractor and Agricultural Machinebuilding], N. Chukhchin, first deputy general director of the NPO [Science and Production Administration] NATI [State All-Union Scientific-Research Institute for Tractors] and V. Rotenberg, manager of the NPO NATI Laboratory: "Reduction in the Metals Intensiveness of Machines"]

[Text] In the modern era, when the production of vehicles and machinery has experienced unprecedented development, a further rise in the utilization effectiveness of material resources has become a first-priority task. This was emphasized by the decisions of the 26th Party Congress and of some of the ensuing CPSU Central Committee Party Plenums.

The importance of managing the rational use of material resources is set not only by the enormous scale of development of machinebuilding but also by the political and economic significance of these resources to expanded socialist reproduction. The consumption of material resources determines the effectiveness of the national economy to a much greater degree than any other element of production outlays.

The 4 April 1983 CPSU Central Committee and USSR Council of Ministers Decree, "Measures for a Further Rise in the Engineering Level and Quality of Machines and Equipment for Agriculture and Improvement of Utilization and Increase in the Production and Deliveries Thereof During 1983-1990" set for tractor and farm machinebuilding the comprehensive task of increasing the productivity, reliability and service life and of reducing the materials intensiveness of the machines. Solving the task also requires an integrated approach to evaluating materials consumption and to the planning of and accounting for material-resources savings.

The following main spheres of savings can be singled out. The national economy as a whole--by improving the indicators of the engineering level of the articles, enabling the prescribed operational work volume to be performed at least expense in materials during the manufacturing process.

The production sphere--through reduction in norms for the consumption of material resources in output of the articles, by improving the production

technology and the design of the machines, by introducing economical types of metal articles, and by making substitutions for metal. Moreover, savings are achieved by reducing rejects and by reducing losses by substituting brand, grade and model sizes and one material by another.

The operating sphere--through reduction of the economy's requirement for spare parts by increasing the reliability of components and machines, by raising the levels of operational repair work and technical servicing, by expanding the variety and number of parts that are reconditioned and making repeat use of them, and by improving the storage of machinery.

In accordance with this, the full estimated specific consumption of metal for producing and operating machines per unit of final useful benefit is determined by the formula

$$G_{y\pi} = \frac{H + H_{sp} T}{W E T}, \qquad (1)$$

where H is the norm for consuming metal for producing the machine;
H_{sp} is the total norm for the consumption of metal for the manufacture of a set of spare parts for a year;
T is the standard service life prior to writeoff;
W is the specification that considers most completely the machine's consumer characteristics; and
E is the average annual utilization.

Until recently, metal savings in machinebuilding were planned and accounted for only in the production sphere. To some extent this held back work on the introduction of new technology, which often increased metal consumption in the production sphere but at the same time reduced it in the national economy by a much greater reduction of expenditures for spare parts and for repair and reconditioning needs.

In 1982, on the basis of methodics recommendat ons, the NII [Scientific-Research Institute] for Planning and Standards under USSR Gosplan for Tractor and Farm Machine Building developed and approved an industry directive. In accordance with it, materials saved by producing tractors, engines, farm machinery and implements whose specifications are improved over the basic model are identified.

New equipment is compared with the base model by means of a standard equivalent norm f consumption, which is used as a base and is computed in accordance n the formula:

$$H_{\text{н.э}}^{(rq)} = H_{\text{б}}^{(rq)} \cdot \frac{B_{\text{н}}^{(q)}}{B_{\text{б}}^{(q)}}, \qquad (2)$$

where the index H relates to the new equipment and б to the basis of comparison (the equipment replaced), r is the type of material resource, q is the type of article, and $H_{\text{б}}^{(rq)}$ is the material-resources consumption norm for the article replaced.

Savings as a result of the introduction and expansion of the output of new (or modernized) articles is found by the formula

$$Э^{(jq)} = (H_{усл}^{(jq)} - H_{н}^{(jq)})Q^{(jq)} . \qquad (3)$$

where j is the planned (or accounting) period; and
Q is the draft of the production plan (or actual output) of the new article within the planned (or accounting) period.

Savings based upon formulas (2) and (3) can be computed both for various types of material resources and for metal as a whole, and the computation is to be reported during analysis of the fulfillment of established tasks.

The procedure for formulating, coordinating and approving computations of savings of material resources also is regulated by the above-mentioned directive.

Computations that have been conducted have indicated substantial effectiveness of new (or modernized) machines planned for assimilation during the 12th Five-Year Plan (see table).

Metal Saved by Increasing the Power (or Productiveness) of Tractors and Agricultural Machinery

New (or modernized machine)	Capacity (or productivity)	Basis for comparison	Capacity (or productivity)	Metal saved per machine, t
Tractors:				
MTZ-100...........	73.6 kW	MTZ-80	55.1 kW	1.24
T-150KM...........	147.2 kW	T-150K	121.3 kW	1.29
MTZ-142...........	110.4 kW	MTZ-82	55.1 kW	3.50
DT-75S............	128.4 kW	DT-75M	66.2 kW	12.87
T-500.............	367.5 kW	DET-250M	242.6 kW	17.33
"Rotor" grain combine	17 t/hr	SK-5A	7.5 t/hr	5.60
Wide-front stubble-field grain drill..	11.5 ha/hr	SZS-2.1	7.7 ha/hr	8.02
Chisel plow for massive working of rock-strewn soils.	2.0 ha/hr	PKG-5-40	1.7 ha/hr	1.30
Ripper for working brackish soils...	3.0 ha/hr	RS-15	1.08 ha/hr	1.90

Simultaneous with increase in the power and productivity of the new and modernized equipment, the industry did much work to improve the equipment's reliability. As a result, the service life of the main components and assemblies of the tractors prior to first overhaul was increased to 8,000 hours, and the running time at breakdown during operation was increased 1.2-fold to 1.5-fold. The amount of technical servicing also was reduced considerably.

The situation is similar also for most farm machinery. This enables consumption norms for spare parts to be reduced, that is, estimated expenditures on materials per machine for making the parts to be cut. Of no little importance is the development within Goskomsel'khoztekhnika [State Committee for Agricultural Equipment] of a system for reconditioning worn parts and reusing them during equipment repair.

Reduction in spare-parts consumption is one of the most important areas for saving material resources. For the country as a whole, the use of metal in producing spare parts for machinery and equipment is comparable with the costs of the metal for the basic production. A similar situation prevailed also in the output of tractor and farm machinebuilding. At present, more than 40 percent of the total volume of steel castings and about 27 percent of the rolled ferrous metal and iron castings are expended on spare-parts output.

As a result of work done to increase the uniformity of strength of designs, it has become possible to reduce spare-parts consumption and to save metal used for parts to keep the machines in efficient running condition during their service life. Thus, the introduction of bogie wheels made of 45FL steel at the Volgograd and Pavlodar Tractor Plants enabled the machine's time before overhaul to be increased by 25 percent and consumption norms for spare bogies to be reduced by 10 percent, yielding a saving of 3,800 tons of metal. The introduction of track links made of 35GTRL steel for T-4A tractors extended their time before overhaul and yielded an annual metal saving of about 17,000 tons, by reducing spare-parts consumption during operation. The consumption norms for spare parts for hydraulic system components, tractor transmissions and engines, plowshares and moldboards, sprockets, gear wheels,and pulleys for grain combines and other machines to be reduced. In so doing, the annual metal savings provided by reducing spare-parts consumption reaches 100,000 tons.

This indicator can be greatly increased later, when it is considered that more than half of the tractors and engines come to overhaul with a service life of 50 percent or more remaining. Moreover, according to data from surveys of tractors that have been written off, about 36 percent of the parts could be used without any repair at all, 43 percent could be used after reconditioning.

Metal saved by reducing spare-parts consumption norms should be calculated in accordance with the industry's directives, in coordination with the NII for Planning and Standards under USSR Gosplan. At the same time, the problem of accounting for savings obtained when fulfillment of the established tasks is being analyzed still must be solved.

With improvement in the planning of and accounting for savings of material resources in the national economy as a result of introducing new machines, attention must also be paid to increasing the service life of new articles prior to writeoff beyond that of the items replaced. Such an approach is adopted by the rules of the existing methods for determining the economic effectiveness of new machines and for establishing wholesale prices for them. In accordance with this, articles with improved indicators of productivity (or capacity) and durability are compared with those of the basic item, not only on the basis of their technical characteristics but also with consideration of the coefficient of change in service life.

The standards-methodics base provides an economic incentive for organizations and enterprises that make the vehicles and machinery to raise constantly the technical level and reliability of them, helping in realization of one of the most important directions for saving material resources.

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CONSTRUCTION MACHINERY AND EQUIPMENT

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SPECIFICATIONS OF NEW EARTHMOVING MACHINES

Rotary Canal-Diggers

Moscow STROITEL'NYYE I DOROZHNYYE MASHINY in Russian No 12, Dec 84 pp 11-12

[Article by Candidates of Technical Sciences B. M. Kizyayev, V. Yu. Manuylov, and Engineer A. B. Zhantlesov (All-Union Scientific Research Institute of Hydraulic Engineering and Land Reclamation imeni A. N. Kostyakov: "Excavator Canal-Diggers for Constructing Optimal Cross-Section Reclamation Canals"]

[Text] Widespread dissemination has been achieved in land-reclamation construction by rotary, plow-rotary, and worm-rotary excavators, which excavate in one pass irrigation or drainage canals with a trapezoidal cross-section. However, studies [1, 2] have shown that the least area of the cross-section, given equal discharges of water being allowed through, is possessed by canals with a hydraulically advantageous, curvilinear profile. Construction of such land-reclamation canals will allow us to reduce the volume of earthwork, reduce the width of the canal and the length of the wet perimeter, and decrease operating expenses.

In order to dig irrigation canals with a curvilinear (parabolic) profile, production has been developed of the ETR-207 worm-rotary excavator canal-digger (Fig. 1) at the Bryansk Irrigational-Machinery Plant, while for digging drainage canals with an optimal cross-section--the ETR-153 twin-rotary excavator canal-digger (Fig. 2) has been developed and put into production at the Kozyrsk Land-Reclamation Machinery Plant.

Fig. 1. ETR-207 Excavator Canal-Digger

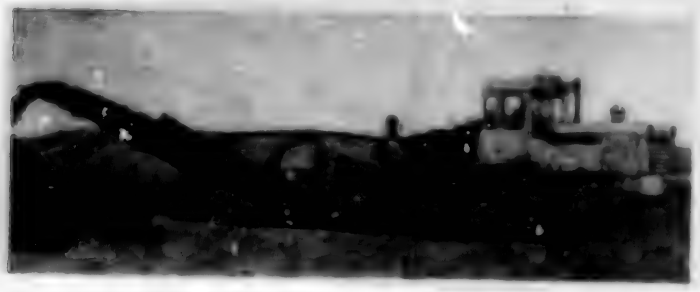
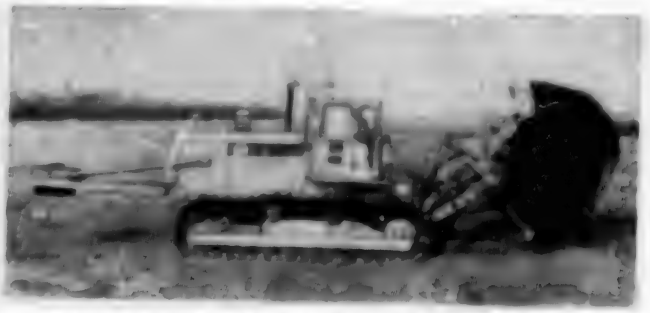


Fig. 2. ETR-153 Excavator Canal-Digger



The ETR-207 excavator canal-digger has been integrated with the basic machine --the ETR-206A worm-rotary excavator. The distinguishing feature of the ETR-207 is the design of the worm-type bank-shapers; they are curvilinear (barrel-shaped) in form.

The following operations are provided for by the production technology of the work of the machine complex: leveling out the canal's right-of-way by a bulldozer or a truck-mounted grader, developing the canal's planned cross-section by the ETR-207 excavator canal-digger, forming the planned banks by a bulldozer, leveling out the top and the bank slopes by a bulldozer. Tests have been conducted on the clay soils of Categories 2-5 inclusive (with a cemented re-dried layer, ranging in thickness up to 1.2 meters) with a moisture content ranging from 11.7 percent on the surface to 18.9 percent on the botton of the canal.

Technical productivity in the Category 2 soils amounted to 318 cu. m per hour, in soils belonging to Categories 4-5 it was 140 cu. m per hour, while the process's energy consumption was 0.37 kW-hours per cu. m.

The ETR-153 excavator canal-digger passed through acceptance testing, and at the present time its serial production has begun.

The ETR-153 [3] excavator canal-digger has been integrated with the basic machine--the twin-rotary ETR-125A excavator. The distinguishing feature of the ETR-153 excavator is the design of the rotors, which have been developed on the same plane as the excavator moves.

The excavator canal-digger has passed through acceptance tests and has been recommended for serial production. Tests on the experimental model of this excavator were run while working out the technology for constructing drainage canals in peat and peat-mineral soils belong to Categories 1-2.

THE TECHNOLOGY FOR CONSTRUCTING DRAINAGE CANALS HAVING AN OPTIMAL CROSS-SECTION WITH A DEPTH OF AS MUCH AS 1.5 METERS CONSISTS OF THE FOLLOWING OPERATIONS: staking out the right-of-way, cutting and uprooting the underbrush with a grubber-collector, filling in the sinkholes and pits with a bulldozer, working out the planned cross-section of the canal with the twin-rotary ETR-153 excavator, and arranging the channel with a channel-maker.

The greatest technical productivity in peat soils has amounted to 550 cu. m per hour, in peat-mineral soils--265 cu. m per hour, and the process's energy consumption amounted to 0.19-0.39 kW- hours per cu. m.

Constructing canals having an optimal cross-section and with the use of the ETR-207 and ETR-153 excavator canal-diggers will allow us to increase the annual production by factors of 1.22 and 1.35 respectively, to lower the production cost of construction by factors of 1.38 and 1.48, to achieve savings on metal of 8.6 and 3.6 tons, on fuel of 9.7 and 24.7 tons, to relatively free up 4.9 and 2.4 persons and free up 5.6-12 hectares of reclaimable area suitable for agriculture per complex of machinery per year.

Technical Features of Excavator Canal-Diggers

	ETR-207	ETR-153
Basic tractor	Improved T-130G tractor	T-130BG-3

Dimensions of the canal, in m:		
depth	2	1.5
width at the top.	5.2	3.5
Cross-section of the excavated canal	Parabolic $y = 0.3x^2$	$y = 0.49x^2$
Technical productivity in Category 2 soils (in peat soils), cu. m per hour	318	(350)
Conveyors:		
number	2	--
width of belt, in mm	800	--
speed of belt when strewing soil on both sides/on one side, in m per sec.	2.5/5	--
Worms:		
number	2	--
type	With curvilinear forming	--
Capacity of rotary bucket, in l	140	--
Number of buckets	14	--
Speed of movement:		
operational (ungraded regulation), m per hour	10-300	29-320
transportational, km per hou	1.87-6.17	2.98-8.66
Average specific pressure on soil, :		
in mega-Pascals	0.08	0.0385
Capacity of engine, in kW	117.7	103
Over-all dimensions, in mm:		
length	12446	10680
width	3197	3200
height	3794	4025
Constructive weight, in tons	40.3	23

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Excavators from Minstroydormash

Moscow STROITEL'NYYE I DOROZHNYYE MASHINY in Russian No 12, Dec 84 pp 15-17

["Products List of Continuous-Action Excavators Being Turned Out by the Plants under the Minstroydormash [Ministry of Construction, Road and Municipal Machine Building]"]

/Text/

Index. Designation of Machine. Manufacturer	Designation. Brief Technical Features
ETR-134. Rotary-type ditching excavator, based on the TT-4 trailer-type tractor Dmitrov Excavator Plant	Designed for digging ditches with a rectangular cross-section in thawed soils belonging to Categories 1-4 and frozen soils under cables, power-transmission lines, and pipelines. Ditch dimensions, in meters: depth to 1.3, width 0.28. Pressure in the hydro system 16 mega-pascals. Speeds of movement: operating 10-640 m per hour, transporting 2.25-9.75 km per hour (8 speeds). Rotor diameter 2.3 m, number of cutters 18. Engine capacity 81 kW. Overall dimensions in the transporting position 6300 X 2550 X 3560 mm. Weight 18,300 kg.
ETR-125A. Excavator Canal-Digger, based on the T-130BG-3 tractor, capable of traveling on swampy land. Mozyr' Land-Reclamation Machinery Plant	Designed for digging drainage canals during one pass in peat and peat-mineral soils belonging to Category 1, including buried wood and stones as large as 80 mm in diameter, without performing the additional work of cleaning and finishing the canal bed. Canal dimensions, in meters: depth to 1.4, width of bottom 0.25. Setting of slopes 1 : 1. Diameter of blade cuts 2.5 m. Speeds of movement: operating 35-225 m per hour (6 speeds), transporting 3.2-7.6 km per hour. Engine capacity 103 kW. Overall dimensions in the transporting position 10,500 X 4030 X 3500 mm. Weight (without extensions) 22, 800 kg.
ETTs-151. Excavator drainage-ditch-digger Dmitrov Excavator Plant	Designed for digging drainage ditches during one pass when building roads and canals with a trapezoidal cross-section in land-reclamation construction in soils belonging to Categories 1-3.

Canal dimensions, in meters: depth 1.5, width at the top 3.2-5.3, on the bottom 0.65 and 0.8. Setting of slopes 1 : 1; 1 : 1.25; 1 : 1.5. Pressure in the hydro system 16 mega-pascals. Speeds of movement: operating 10-150 m per hour, transporting 2.25-9.75 km per hour (8 speeds). Engine capacity 81 kW. Over-all dimension in the transporting position 8,000 X 3,000 X 3,270 mm. Weight 19,800 kg.

ETTs-165A. Excavator-chain-type ditch-digger, based on the MTZ-82 Belarus' tractor

Tallinn Talleks Production Association

Designed for digging ditches with a rectangular cross-section in thawed and frozen soils under cable communications lines, power lines, and pipelines, as well as for modest-sized grading operations with the aid of a universal, bulldozer moldboard.

Ditch dimensions, in meters: depth 1.6, width 0.2; 0.27, and 0.4. Length of moldboard 2,240 mm. Depth of blade 150 mm. Speeds of movement: operating 20-800 m per hour, transporting 1.89-33.4 km per hour. Number of scrapers 4 (at a chain width of 0.4 m) and 5 (at a chain width of 0.27 m); number of cutters 20 and 18 respectively. Engine capacity 55 + 3.5 kW. Over-all dimensions in the transporting position 7,000 X 2,250 X 3,200 mm mm. Weight 6,000 kg.

ETTs-208B. Excavator-chain-type ditch-digger, based on T-130.MG-1 tractor

Tallinn Talleks Production Association

Designed for digging ditches with a rectangular cross-section in homogeneous, frozen and particularly firm, thawed soils during land-reclamation and general-construction earthwork.

Ditch dimensions, in meters: depth 2, width 0.6. Speeds of movement: operating to 340 m per hour, transporting up to 5 km per hour. Number of cutters 72. Engine capacity 118 kW. Over-all dimensions in the transport position 9,445 X 2,740 X 3,285 mm. Weight 24,200 kg.

ETTs-208D. Excavator-chain-type ditch-digger, based on T-130.MG-1 tractor.

Tallinn Talleks Production Association

Designed for cutting narrow slits in frozen soil for purposes of subsequent working by other earth-moving machinery, as well as ripping up frozen soil by means of lengthy explosive charges. Used in the construction of mainline gas- and petroleum-pipelines in the country's northern regions, as well as in general-construction earth-moving operations during wintertime. Working equipment--cutting organ (bar) of the Ural-33 cutting machine.

	Slit dimensions, in meters: depth 2, width 0.14. Speeds of movement: operating to 475 m per hour, transporting to 5 km per hour. Engine capacity 118 kW. Over-all dimensions in the transport position 9,800 X 2,880 X 3,370 mm. Weight 20,000 kg.
ETTs-202B. Excavator-drain-placer on caterpillar treads. Tallinn Talleks Production Association	Designed for the construction of clay and plastic drainage systems. Equipped with an automatic tracking system for maintaining the assigned incline of the ditch bottom. Ditch dimensions, in meters: depth 2, width 0.5. Diameters of drainage pipes, in mm: ceramic clay 50-190, plastic 90. Speeds of movement: operating to 620 meters per nour, transporting to 4.7 km per hour. Engine capacity 44 kW. Over-all dimensions in the transport position 11,500 X 2,700 X 4,950 mm. Weight 10,800 kg.
ETTs-206. Excavator-drain-placer, based on T-130MBG-1 tractor, capable of traveling on swampy land. Tallinn Talleks Production Association	Designed for the construction of clay and plastic drainage systems in wintertime. Equipped with an automatic tracking system for maintaining the assigned incline of the ditch bottom. Ditch dimensions, in meters: depth to 2, width 0.6. Diameters of drainage pipes, in mm: ceramic clay 50-190, plastic 90. Speeds of movement: operating to 255 meters per hour, transporting to 5 km per hour. Engine capacity 103 kW. Over-all dimensions in the transport position 9,980 X 3,240 X 5,000 mm. Weight 28,000 kg.
ETR-204. Excavator-rotary-type ditch-digger, based on the T-130MG tractor. Bryansk Irrigation Machinery Plant	Designed for digging ditches under mainline pipelines in soils belonging to Categories 1-4, as well as soils which freeze to a depth of 1 m. In order to prevent cave-ins in friable soils, ditches can be excavated with sloping banks. Ditch dimensions, in meters: depth 2, width 1.2. Rotor diameter 3.56 m. Bucket capacity 140 liters, number of buckets 14. Speeds of movement: operating 10-300 meters per hour, transporting 1.26-5.06 km per hour. Engine capacity 118 kW. Over-all dimensions in the transport position 11,100 X 3,200 X 4,200 mm. Weight 31,500 kg.
ETR-206A. Excavator-canal-digger, based on the T-130 MG tractor Bryansk Irrigational Machinery Plant	Designed for digging canals in soils belonging to Categories 1-3, with a strewing of soil to one or both sides of the canal. Canal dimensions, in meters: depth 2, width along the bottom 0.6; 0.8; 1; 1.2; 1.5. Setting of

	slopes 1 : 1; 1 : 1.25; 1 : 1.5; 1 : 1.75; 1 : 2. Rotor diameter 3.56 m. Bucket capacity 140 liters, number of buckets 10. Speeds of movement: operating 10-300 meters per hour, transporting 1.26-6.03 km per hour. Engine capacity 118 kW. Over-all dimensions in the transport position 12,400 X 3,200 X 4,200 mm. Weight 41,000 kg.
ETR-207. Excavator-canal-digger, based on the T-130MG tractor. Bryansk Irrigational Machinery Plant	Designed for digging canals with an optimal parabolic cross-section ($y = 0.3x^2$) in soils belonging to Categories 1-3 with stony inclusions measuring no more than 200 mm in size. Ditch dimensions, in meters: depth 2, width at the top 5.16. Rotor diameter 3.56 m. Bucket capacity 140 liters, number of buckets 10. Speeds of movement: operating 10-300 meters per hour, transporting 1.26-6.03 km per hour. Engine capacity 118 kW. Over-all dimensions in the transport position 12,440 X 3,200 X 3,800 mm. Weight 41,000 kg.
ETR-223. Excavator-rotary-type-ditch-digger, based on the T-130MG tractor Bryansk Irrigational Machinery Plant	Designed for digging ditches under mainline pipelines in soils up to Categories 1-4, as well as in soils which freeze to a depth of 1 meter. In order to prevent cave-ins in friable soils, ditches can be excavated with slopes. Ditch dimensions, in meters: depth 2.2, width 1.5 m. Rotor diameter 3.83 m. Bucket capacity 160 liters, number of buckets 14. Speeds of movement: operating 10-300 meters per hour, transporting 1.26 -5.06 km per hour. Engine capacity 118 kW. Over-all dimensionsin the transport position 11,500 X 3,200 X 4,240 mm. Weight 33,500 kg.
ETR-224. Excavator-rotary-type ditch-digger, based on T-130MG tractor Bryansk Irrigational Machinery Plant	Designed for digging ditches under mainline pipelines in soils belonging to Categories 1-4 as well as soils which freeze to a depth of 1.2 m. In order to prevent cave-ins in friable soils, ditches can be excavated with slopes. Ditch dimensions, in meters: depth 2.2, width 0.8. Rotor diameter 3.83 m. Bucket capacity 85 liters, number of buckets 15. Speeds of movement: operating 10-300 meters per hour, transporting 1.26-5.06 km per hour. Engine capacity 118 kW. Over-all dimensions in the transport position 11,500 X 3,200 X 4,240 mm. Weight 31,500 kg.

ETR-253-A. Excavator-rotary-type ditch-digger, based on the DET-250M tractor. Bryansk Irrigational Machinery Plant	Designed for digging ditches under mainline pipe lines 1420 mm in diameter in thawed soils up to Category 4 inclusive and in frozen soils with a freezing depth of as much as 1.5 m (in thawed soils up to Category 3--with slopes, in Category 4 soils and in frozen soils--without slopes). Ditch dimensions, in meters: depth 2.5, width at the bottom 2.1, at the top 3.2. Rotor diameter 4.5 m. Bucket capacity 250 liters, number of buckets 14. Speeds of movement: operating 20-350 meters per hour, transporting 1-6 km per hour. Engine capacity 210 kW. Over-all dimensions in the transport position 13,400 X 3,700 X 5,010 mm. Weight 61,800 kg.
ETR-208. Excavator-canal-digger on a standardized chassis, using assemblies of the K-701 and T-130MG tractors. Bryansk Irrigational Machinery Plant	Designed for digging canals in soils belonging to Categories 1-3, with a strewing of soil onto one or both sides of the canal. Canal dimensions, in meters: depth 2.5 (with slope settings at 1 : 1.25; 1 : 1.5; 1 : 1.75; and 1 : 2). Rotor diameter 4.5 m. Bucket capacity 250 liters, number of buckets 14. Speeds of movement: operating 17-200 meters per hour, transporting up to 4.55 km per hour. Over-all dimensions in the transport position 14,300 X 3,240 X 4,000 mm. Weight 52,000 kg.
ETT-252. ETT-252A. Chain-type excavator-ditch-diggers, based on the TT-4 trailer-tractor. Dmitrov Excavator Plant	Designed for digging ditches with a rectangular or trapezoidal cross-section in soils belonging to Categories 1-4, as well as in soils which freeze to a depth of as much as 1.2 meters. Ditch dimensions, in meters: depth 2.5 and 3.5; width at the top 2.8, at the bottom 0.8 and 1. Pressure in the hydro system 16 mega-pascals. Speeds of movement: operating 10-150 meters per hour, transporting 2.25-9.75 km per hour. Engine capacity 81 kW. Over-all dimensions in the transport position: 10,200 X 3,450 X 3300 mm. Weight 18,600 (19,500) kg.
ETR-301. Excavator-canal-digger, based on the reconstituted T-180 tractor Bryansk Irrigational Machinery Plant	Designed for digging canals in soils belonging to Categories 1-3, with stony inclusions measuring as much as 300 mm in size. Canal dimensions, in meters: depth 3, width at bottom 1.5; 2; 2.5. Setting of slopes 1 : 1.5; 1 : 75. Rotor diameter 5.09 m. Bucket capacity 190

	liters, number of buckets 16. Speeds of movement operating 5-65 meters per hour, transporting 2.99-4.88 km per hour. Capacity of diesel-generator plant 200 kW. Over-all dimensions in the transport position 22,600 X 5,100 X 6,100 mm. Weight 76,200 kg.
ETT-406. Excavator-drain-placer, based on the T-130 tractor. Bryansk Road Machinery Plant imeni 50th Anniversary of the Great October Revolution	Designed for placing covered drainage systems in soils belonging to Categories 1-3, along with simultaneous insulation of the drains with sand-and-gravel material and back-filling of the ditch. Ditch dimensions, in meters: depth to 4.5, width 0.66; incline of bottom 0.01-0.001. Diameter of drainage pipes 100-200 mm. Bucket capacity 70 liters, number of buckets 20. Engine capacity 118 kW. Over-all dimensions in the transport position: 19,480 X 5,630 X 8,720 mm. Weight 44,000 kg.
EM-251. Chain-type open-pit excavator with electric multi-motor drive on rail track. Dmitrov Excavator Plant	Designed for excavating upper and lower layers of soils to Category 3 inclusive, containing up to 10 percent of solid inclusions measuring as much as 100 mm in size. Greatest height of excavation 7 meters, greatest depth of excavation 8 meters. Bucket capacity 25 liters, number of buckets 28. Operating speed of movement 180 meters per hour. Capacity of electric motors 29 kW. Over-all dimensions 19,680 X 4,790 X 4,880 mm. Weight 13,000 kg.

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CONSTRUCTION MACHINERY AND EQUIPMENT

HUGE CATERPILLAR-TYPE EXCAVATOR REDESIGNED

Leningrad LENINGRADSKAYA PRAVDA in Russian 25 Jan 85 p 2

[Article by S. Davydov, correspondent for the Leningrad section of TASS: "The Might of the Steel 'Laborers'"]

[Text] A vehicle with a bucket capacity of 15 cubic meters will become the most productive in the line of quarry caterpillar excavators in lot production at the Izhorskiy Plant imeni A.A. Zhdanov association.

Such units are replacing the "self-propelled" with 12 cubic meter buckets. Today the biggest assemblies of the giant new machine are being dispatched to the client. In all, it will take up 36 railroad platforms in transport.

In order sharply to increase the productivity of mining equipment without increasing its weight, the association's designers worked out a number of original mechanisms. The steel "laborers", designed for stripping operations in the coal quarries of Siberia and the Far East, are equipped with more powerful engines and improved regulating systems. Many assemblies that performed well on previous machines are used in the design here. Unification has significantly reduced the time needed to prepare the new equipment for work.

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CONSTRUCTION MACHINERY AND EQUIPMENT

PRODUCT MIX OF NEW YELABUGA TRACTOR PLANT

Moscow STROITEL'NAYA GAZETA in Russian 12 Oct 84 p 1

[Commentary by V. Korovin, chief of the capital construction directorate of the USSR Ministry of Tractor and Agricultural Machine Engineering: "On a Course of Advancement"]

[Text] As reported in the press, the problem of the construction of plants for the production of 150-horsepower universal row-crop tractors as well as of diesel engines and fuel apparatus for them was examined at a session of the Politburo of the CPSU Central Committee. And here in the city of Yelabuga, Tatar ASSR, the first stone was laid, amid ceremonious circumstances, signifying that a giant new project has been begun.

Our correspondent, G. Kiksman, has asked V. Korovin, chief of the capital construction directorate of the USSR Ministry of Tractor and Agricultural Machine Engineering, to comment on this event.

First the significance of plants. They should play a large role in the realization of the Food Program and in the further development of the scientific-technological level of agricultural production. Indeed, after the enterprises are put into operation hundreds of tractors will roll off their conveyors every day. And what tractors! They are almost twice as strong as their predecessors, and able to do labor-intensive work with a variety of multiserial and combined machines in the cultivation of potatoes, vegetables, corn and beets. And if one considers that in our country about half of the labor expenditure goes to cultivated crops, then it becomes clear how important it is to begin the construction of plants and continue it at accelerated speeds in order to put them into operation in the shortest possible time.

Vast projects are forthcoming. In a 700-hectare area it is necessary to assimilate an average of 150 million rubles worth of construction annually.

The commissioning of production will be carried out step by step. For example, the repair-tool facility in 1987, storage blocks--foundry and metalworking--in 1988, plants for producing engines and diesel apparatus in 1988-89... The tractors will come off the conveyor at the end of the 12th Five-Year Plan.

Housing blocks and socialist culture facilities will be built at the same time in the complex with the plants. In these years the city, where one- and two-story houses predominate, will turn into a most modern center, both in terms of architecture and in terms of conveniences for its inhabitants, who will number about 150,000. How can one not recall the famous KamAZ [Kama Motor Vehicle Works] and the city of almost a half million that grew up with it!

This comparison is not coincidental. For the establishment of the tractor giant has been entrusted to the same organizations that were involved in KamAZ. And in the first place to the highly experienced collective of the Kamgesenergostroy production association.

Neither were the choices of Yelabuga, the given association, and the subdivisions of the USSR Minmontazhspetsstroy* that are concentrated in the Tatar ASSR coincidental. Economic expediency dictated them, primarily. Indeed, the builders have available such a powerful base, located only 20 kilometers from the project, that it can completely satisfy the requirements at first without detriment to other installations. So the need no longer arises of building it from "zero", which allows an immediate start, without wavering, of work at the site and a reduction of at least one year, by all calculations, in the projected time for turnover of the plants.

In order that this become real, our ministry, jointly with the contractors, worked out a plan of measures for the realization of primary tasks and for the development of planning and construction of the enterprises. In particular, the measures stipulate that the construction be provided this year and next with the necessary documentation, technical-economic grounds, etc. According to the KamAZ experience, it has been decided to carry out construction parallel with planning, which will again accelerate the construction of the facilities.

All factors attest to the fact that the production of the first tractors will undoubtedly begin in the planned compressed period. This depends both on us, the client, and on the builders, assemblers, planners... In a word, on the total efforts of all those who are in one way or another concerned with the construction of the tractor giant.

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* [Ministry of Installation and Special Construction Work]

CONSTRUCTION MACHINERY AND EQUIPMENT

PERFORMANCE OF EXCAVATORS IN COLD ENVIRONMENTS

Moscow IZVESTIYA in Russian 5 Oct 84 p 2

[Article by A. Khudyakov, excavator operator, SU-2 [construction directorate] of the Surgutspetszhilstroy trust: "An Excavator for the North"]

[Text] Nefteyugansk, Tyumen Oblast--Every construction job starts from zero--the excavation, laying lines of communication, finally putting in the foundation--the bases of the future building.

Let's recall the first five-year plans. How many cubic meters of earth had to be turned over with ordinary shovels by a whole army of laborers! These pictures are familiar to us from old documentary film clips. But the modern laborer is the excavator operator, who commands a powerful machine.

In the Tyumen North I had occasion to work on three types of excavators: the EO-4121, EO-5123 and the Czech DN-101.

The EO-4121 is the most massive machine in construction today. But it cannot be called modern. The proof of this is in the surplus in Nefteyugansk, Surgut, Noyabrsk and the yards of all the organizations that are conducting excavations. After six months of intensive operation, the machine's hydraulic assemblies begin to leak. And repairing them on site is a useless proposition.

The Czech machine is not bad. But the instructions warn: operation to minus 25 degrees. We work in more severe cold. On their own, workers from the Yugansk-neftespetsstroy trust adapted an excavator to the conditions of the north, augmenting the pre-ignition heating, installing a domestic engine and modifying the hydraulics. But this, of course, is not the solution.

Machines from the Voronezh Excavator Engineering Association imeni Komintern, the EO-5122 and EO-5123, with a bucket volume of 1.25 cubic meters, have begun appearing in the north. They have reliable engines and hydraulics. But in all fairness one must say that the quality of manufacturing, and especially of assembly, of the machines for the time being leaves much to be desired.

From my experience, I should say that for now this is the best machine for the north. Therefore, in my opinion, it is necessary to increase the production of EO-5123 excavators sharply as the most productive and reliable. Possibly even

at the cost of a partial reduction in the production of other types of excavators. Moreover, taking the EO-5123 design as a basis and considering everything good that has been achieved at other excavator-producing plants, it is necessary to develop a family of unified construction excavators as soon as possible.

We also must have service that will guarantee the reliable operation of the machines in the field. Here in Nefteyugansk or Surgut it would make sense to set up self-supporting organizations, under the authority of the manufacturing plants, which would carry out the preparation of new excavators for work. They should conduct planned service, small repairs and replacement of assemblies. I think that this will significantly increase the service life of an excavator and improve relations between manufacturing plants and builders.

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CONSTRUCTION MACHINERY AND EQUIPMENT

BRIEFS

NEW EXCAVATOR FROM KRAMATORSK--Kramatorsk--The detail design for a new walking excavator, the ESH-15/80, has been completed at the association Novokramatorskiy Machine Building Plant. This giant will have a bucket capacity of 15 cubic meters and a boom length of 80 meters. Its application is in stripping operations in the preparation of new coal and ore deposits and other deposits of mineral resources. The productivity of the new excavator amounts to four million cubic meters of stripping per year. [By N. Lisovenko, IZVESTIYA correspondent] [Text] [Moscow IZVESTIYA in Russian 10 Jan 85 p 2] 12461

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CONSTRUCTION METHODS AND MATERIALS

FACTORS IN INCREASING PRODUCTION EFFICIENCY

Moscow STROITEL'NYYE MATERIALY in Russian No 3, Mar 85 pp 2-5

[Article by Ye. L. Radevich, director of the Osipovich Roofing Paper-Felt Plant imeni 25th Party Congress]

[Text] Comrade K. U. Chernenko, in his speech at the CPSU Central Committee Politburo meeting in November 1984, stressed that the common problem that must permeate the work of all sectors, of all enterprises in our time, is better management, more efficient utilization of resources and better work in producing results.

The collective of the Osipovich Roofing Paper-Felt Plant imeni 25th Party Congress, having undertaken the labor watch on fulfilling the tasks of the final year of the current five-year plan period and a worthy reception to the 27th party congress, sees as the basic road for solving the posed problems, the achievements of a higher standard of work quality in further rationalizing all links of the production process.

The plant workers did not do so badly in 1984.

The plan for the fourth year of the five-year plan period was fulfilled with the following indicators: some 31,7'5,000 rubles worth of commercial products were produced instead of 31,500,000 rubles per plan. Some 132 tons of roofing paper, 264,000m^2 of felt, as well as 1,215,000 rubles worth of consumer goods were manufactured above the plan. The ratio of products of the highest category of quality was 50.7 percent instead of 49.9 percent per plan.

Our collective also coped with socialist obligations: obligations on output of commercial products were fulfilled by 128.9 percent; felt -- by 120 percent; roofing paper -- by 132 percent; indicators for manufacturing products of the highest category of quality were overfulfilled.

We strove to utilize all possible factors that would make possible an increase in the efficiency of labor. Below is described what we were able to do.

The Osipovich Roofing-Felt Plant is a child of the 9th Five-Year Plan. Its construction began in 1967. Its first stage was a shop for manufacturing 50,000 tons of roofing paper per year and it was placed into operation in March 1972. The

second stage was a shop for manufacturing 125,000,000m^2 of felt per year placed in operation in April 1973.

A number of organizational-technical questions was decided at that time as follows: production technology of roofing paper and felt were improved; part of the equipment was modernized; production processes were comprehensively mechanized and automated; the territory of the plant was put in good order; problems of industrial esthetics and labor safety were solved actively. All this made it possible to master capacities for the production of roofing paper five months ahead of schedule and 14 months ahead of schedule for the output of felt. By the start of 1974, we reached world standards for the quality of roofing paper.

A Comprehensive Quality Control System [KS UKP] began operating at the enterprise in 1976. The purpose of this service was to promote better quality of the manufactured product and lengthening the time of its operation (long life and reliability); a systematic increase in the volume of the product with the state Emblem of Quality and a reduction in substandard products; continuous improvement in the production-technical base and full observance of technological production modes, as well as state and industrial standards; training a sense of responsibility for the quality of his labor in every worker, employee, engineer and technician; achievement of high modern standard of production in shops, departments and at each work position.

The following is being done to implement the KS UKP problems. The current (monthly and annual) product quality is planned according to the five-year plan. Current plans for measures to improve the quality and reliability of the product, including instructions on schedules and responsibilities, are prepared , for each shop. Their execution is monitored by the quality control laboratory.

In 1978, the KS UKP with 54 standards of the enterprise, was registered by the Belorussian Republic Metrology and Standardization Center. At present, 63 standards are in operation at the plant.

Organizational, training, engineering, technical and monitoring measures were developed at the plant for systematically monitoring the execution of functions imposed on the KS UKP.

The organizational measures (developed monthly by production shops) are directed toward eliminating defects and improving the quality of manufacture of the products, the organizational and improvement of the work of technical, economical and other servicess

Training measures are being conducted on quality evaluation days; the organization of socialist competition for the title of "Outstanding Quality Worker", the use of radio publications, lectures, talks on the role of high product quality, and propaganda on advanced labor methods. Wide publicity is given to the results achieved by using faultless labor systems.

Engineering technical and monitoring measures involve the development and introduction of progressive technological processes, the creation of monitoring technology, a check by OTK [Quality Control Department] workers and laboratory of the

observance of the technological discipline, the implementation of spot checks and receiving inspection, as well as preventive work in shops.

A quality coefficient is used to measure moral and material incentives for high product quality. Depending upon achieving the latter, workers of all shops and departments, as well as engineers and technicians receive bonuses, which increase the interest of each worker in a high level of work quality.

Shop chiefs, mechanical engineers, senior foremen and technologists are involved directly in introducing KS UKP on the basis of methodological instructions. This year, it is planned to analyze the status of the problem on product quality and the functioning of the comprehensive quality control system and increasing the efficiency of production, as well as developing new standards and reviewing existing ones and forms of working projects for improving KS UKP and EP [Economic Plan]. The economic effect from the functioning of the KS UKP and EP at the plant averages over 60,000 rubles annually.

One basic direction for raising product quality is the certification of technological processes. It means a system of organizational-technical and economic measures for evaluating technological processes and assigning to those processes systems which guarantee the manufacture of materials and products of high quality and meet modern requirements a certificate of quality. This system is directed to a systematic increase in the technical standards of technologies, the introduction of scientific technological achievements and provides conditions for guaranteeing a stable output of products that meet the required corresponding standards.

In 1983, preparations for technological process certification began at the plant. A permanent certification commission was appointed under the guidance of the chief engineer. An enterprise standard was developed which determined the order, organization and procedure for certifying technological processes. Working commissions were created in the shops headed by shop chiefs. The commission evaluates the standard of the technological process, develops and implements measures on carrying out the technological processes to the planned technical level.

To help shop commission workers and in order help the efficiency on technological process certification, a group of basic engineers and technicians was formed in the chief technologist's department. In problems of introducing developing and improving the quality control system of the product, it is guided by directives of party, Soviet and economic organs of the republic, the technical norms of Gosstandart, as well as the "Regulation on a group for product quality control in the area of 'certification' of the technological process" developed at the plant.

The plant certification commission proposed the following organizational technological measures which have been implemented: in the clamping shaft of the third press of the roofing paper making machine and the cutter shaft of the PRS [expansion unknown], the press scraper design was changed and the operation of the final impregnation chambers on the felt machines was regulated. Due to these and other measures in 1983-1984, the quality of the manufactured products improved. Last year, the ratio of products with the state Emblem of Quality was 50.7 percent. The output of roofing paper increased by 132 tons and of felt -- by 264,000m^2.

At present, the certificate of quality was given to four basic technological processes and one was prepared for certification. We plan to certify three more technological processes.

As a result of the work done in the enterprise, the technical standard of the technological processes increased considerably; scrap losses were reduced; last year not one complaint was received with regard to product quality; and the productivity of labor increased. During the four years of the current five-year plan period, labor productivity increased by 5.9 percent, while in 1984 it was 107.3 percent.

The entire increase in the production volume at our plant was due to higher productivity of labor. The introduction of the achievements of science engineering and advanced technology accounts for 70 percent of the increase (30 percent due to improved management). This was facilitated by the mechanization of the transport and storage of coloring powders; the use of a device for pressing units of the BKSMB-55 tower cranes; the redesign of the roofing paper depresser and the clamping vanes of two-shaft mixers; a change in the design of the unloading RT-50 thermal defibration device; inproved production control, the introduction of the scientific organization of labor, norms for utilizing work time, more highly skilled workers, the introduction of typical plans for the organization of work positions and a change in several kinds of products.

We pay great attention to the improvement of production management and the greater responsibilities of engineers, technicians and employees, including the middle link, for the entrusted tasks.

The increase in the standard of management was aided by the introduction of the KS UKP; by the comprehensive production control system; as well as by the organization of labor and wages using the VAZ [Volga Automobile Plant] experience. According to this experience, we study the organization of labor at each work position. On the basis of time studies, labor organization charts were developed which envisions the use of the most efficient labor methods as well as production training for their assimilations.

A special feature of the VAZ system, which we borrowed, is using the brigade form of labor organization in basic, as well as auxiliary production facilities. The brigades are composed mainly according to the technological cycle. To develop further the creative initiative of workers further, and raise their roles in solving important production problems and developing socialist competition, brigade councils were created in collectives numbering 25 persons or more.

The brigade council together with the foreman evaluate the participation of each worker in fulfilling the norm task set by the brigade and adopts decisions on the size of additional payments and bonuses to each brigade member. There, the labor quality coefficient is taken as a basis, which includes quantitative and qualitative indicators and serves as a criterion of labor participation. The brigade council considers problems of the professional growth of its members, labor discipline, mode of everyday behavior, etc. Thus, the activity of each member facilitates strengthening production and labor discipline and social life of the brigade and trains the exact requirements and high consciousness from each other.

At present, there are 55 brigades at the plant, including 34 comprehensive brigades with wages according to the VAZ experience and 21 brigades on the basis of existing conditions of the labor organization. The brigade form spans 87.6 percent of workers.

One of the efficient measures at the plant directed toward saving and efficiently utilizing raw material, fuel-power and other material resources, is the introduction of a norm method of accounting for production costs. A commission of 10 main specialists chaired by the deputy production director was created to implement a number of organizational measures in this direction. Together with the staff workers of the Minsk NIISM [Scientific Research Institute of Construction materials] a "Regulation for the norm method of accounting for production costs at the Osipovich KRZ Roofing Paper and Felt Plant " was developed. Instructions were given to all engineers, technicians and employees of the plant on using norm accounting principles. Norms for the consumption of raw and other materials were systematized and expense budgets for servicing production, and management were prepared. Forms for primary accounting documentation and documentation for operational detection of deviations from norms were developed; the organization of warehousing was reviewed, etc.

At the end of that year, the enterprise changed over to cost accounting using the norm method. This method envisions accounting for changes in norms and deviations from them, and the calculation of actual production costs on the basis of preliminarily prepared calculations of the cost of norm production.

Since our enterprise manufactures, a uniform product with a short technological cycle, production conditions are stable, remnants of incomplete production are small and norms practically do not change during the year; therefore, norm changes are not taken into account and plan calculations are used. Raw and other materials and power resources are released in accordance with the limits order charts according to technically substantiated norms. Their release above the limit is done by permission of the chief engineer or deputy production director.

Shops prepare ten-day reports on the consumption of raw and other materials and power resources; on detected deviations from the norms, with statements indicating their reasons and the guilty ones in overconsumption. An order is established for the release of each kind of raw and other materials and power resources by measurement, devices and weighing. Deviations from wage norms are detected by the same principle as in the consumption of raw and other materials.

A daily report is prepared at the warehouses on the production activity of the plant for a 24 hour period for operational monitoring of the consumption of raw and other materials taking into account the remainders of the materials.

Since the share of materials costs in the cost of production is high (over 75 percent) special attention is given to norms and accounting for raw and other materials. According to the work results for last year 320,000 rubles were saved in production costs, including 179,000 rubles in material costs, i.e., production costs were reduced by 1.5 percent which was greater than the socialist obligations.

The following were saved during the record period: 431,000 kw-hours of electrical power, 313 gigacalories of heat, 300 tons of asphalt, 1335 tons of rags, 170 tons of asbestos pebbles, etc.

One of the important factors in raising the efficiency of production in the plant is mastering the technology of new efficient materials. In the years of the 11th Five-Year Plan period, several new kinds of products were added to the list, such as: built-up felt of the RM-420-1:0 brand, colored felt of the TKTs-420 brand and the RKK-420A felt with a large grain coating. The RM-420-1 felt was 21 million m^2 and of RKTs-420-17.5 million m^2.

Organizational technical measures are being implemented at the plant to master and increase the volume of production. These measures envision modernization of existing technological lines, the introduction of new processes, etc. In particular, to obtain built-up felt winding and packing, machine tools were modernized for reverse winding of cloth and a process was introduced for preparing the roofing mass. The assimilation of new efficient materials made it possible for the enterprise to increase the net norm production for the four years of the current five-year plan period by 480,000 rubles.

At present, efforts of the collective are directed toward meeting the 40th Anniversary of the victory of the Soviet people in the Great Fatherland War in a worthy manner. The intraplant socialist competition among basic shops to fulfill the state plan ahead of schedule was developed widely. Their summaries are made weekly. The shift or the brigade in first place are given the rotating pennant.

In honor of the 40th Anniversary of the Great Victory, the collective of our enterprise adopted higher social obligations:

work under the slogan "40th Anniversary of the Great Victory -- our highly productive labor and examplary discipline;"

fulfill the task in 4 years and 4 months of the five-year plan by 25 April 1985;

produce 2.3 million m^2 of felt and sell products worth 1 million rubles by 1 May above the five-year plan.

Examples of conscientious attitudes are shown by leading workers and production innovators. Shift collectives of senior foreman P. A. Senyenov (roofing paper shop) and senior foreman V. A. Pankratovich (felt shop) work creatively and with enthusiasm. They were victors many times in intrashop socialist competition. An example of labor enthusiasm is shown by the brigade of device operators V. A. Goravskaya -- the brigade fulfilled the plan for 4 years and the annual plan by 1 December, 1984; the brigades of device operator Ye. A. Borisenka, machine operator G. M. Maksimova, repair mechanic S. G. Mironchik and many others did likewise.

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CONSTRUCTION METHODS AND MATERIALS

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IMPROVEMENT OF AUTOMATION IN CONSTRUCTION MATERIALS INDUSTRY

Moscow STROITEL'NYYE MATERIALY in Russian No 3, Mar 85 pp 9-10

[Article by G. N. Vabishchevich, general director of the Soyuzavtomatstrom All Union Scientific Production Association, candidate of technical sciences]

[Text] Problems in scientific technological progress in industry are determined by the requirements of today and the entire economic policy of our party and state. The successful solution of the problems, determined by the decree of the CPSU Central Committee and the USSR Council of Ministers "On measures for accelerating scientific technological progress in the national economy," on automation by using computers, is possible and realistic in the construction materials industry by solving a number of complicated scientific technological problems and adopting the necessary organizational measures.

In connection with this, we will dwell on several problems that, in our opinion, are of principal importance.

The experience in automating technological processes accumulated by the Minpribor [Ministry of Instrument Making, Automation Equipment and Control Systems], scientific research, planning and design organization of the USSR Minstroymaterialy [Ministry of Construction Materials], including Soyuzavtomatstroy, attest to a substantial increase in the efficiency of production facilities, equipped with the systems and means for monitoring and control. The effect of automation on processes in industry result in higher productivity of labor, greater output and, what is very important, reduced consumption of fuel-power resources. All these factors produce savings which make it possible, as a rule, to repay capital investments within 3 to 3.5 years for even the creation of fairly complicated systems.

A no less important factor in creating, for example, an automatic system for controlling technological processes (ASU TP), automated technological complexes (ATK) and other kinds of automatic systems is the effect it has in the social area, namely, radical improvement in labor conditions, the appearance of new, more prestigious modern professions at the plant: operators of automatic complexes, electronic engineers, programers, etc. It is impossible to calculate these areas in rubles, but their significance is difficult to overestimate.

Several dozens of ASU TP and ASUP were introduced into the construction materials industry in the 10th and 11th five-year plan periods.

A number of original systems and automation equipment for controlling technological processes on a level of the best domestic and foreign prototypes, created during this period, passed approval at enterprises of various sectors of the construction materials industry.

In the cement industry, for example, ASU TP were developed and introduced for preparing the raw materials mixture in batch and technological flow-line arrangements for providing calcining furnaces with a mixture of a given chemical composition; for grinding raw materials to optimal reduction in size and moisture of the mixtures; for calcining clinkers in furnaces working on gaseous fuel which optimize the process of clinker formation in the furnace and the refrigerator, as well as of the grinding of the cement charge.

At present, special attention is being given to the automation of cement plants that operate on the dry production method, equipped with modern technological lines with a capacity of 1600 to 3000 tons of cement per day.

At present, the Lipetsk, Novo-Karandinsk, Novo-Spassk, Navoysk and Krivoy Rog cement plants are equipped with automatic control systems. In the future, all newly planned, building and modernized plants will be equipped with modern ASU. Here should be stressed the advisability and efficiency of the comprehensive (systematic) design of technology and automation and, on this basis, the creation of automatic technological complexes (ATK). The following special features of ATK design can be pointed out.

The use of simulation methods for synthesizing ATK makes it "play the game" on models in an accelerated time scale to show the progress of the technological processes, evaluate the quality of control, compare various versions differing in technological arrangements, equipment and control systems. This makes it possible to simplify technological arrangements and reduce capital investments in construction and equipment.

Work is being done on a broad front in the ceramics sector of the industry on automating plants for continuously sorting clay, lean grinding, drying and dehydrating the slip and conveyor lines for drying and calcining ceramic plates. At present, most of these plants designs were developed basically of systems for automatic regulation using analog equipment, which are transmitted to the Giprostroy Institute for application to specific facilities.

A considerable volume of work was done on the comprehensive automation of the entire production of ceramic plates. Thus, the Voronezh Glazed Earthenware Products Plant developed and introduced a design for automating a shop for producing floor tiles consisting of an ASU TP for sorting clays, mixing, drying the slip, and drying and firing the plates. This experience is used widely at present for designing the ATK of the Volgograd Ceramics Plant and the Leningrad Plant of Ceramic Products. For example, the Volgograd Plant will have five ASU TP. They include an ASU for lean grinding in gas-jet mills, preparation of slip and press-powder, drying and firing on conveyor lines and an ASU for a transportation flow line system for the press-powder.

It should be noted that along with solving the automation problem, a set of design solutions was developed and introduced on modernizing technological arrangements in sections for preparing the slip and a transport flow line system for the press-powder. These solutions will be incorporated by the Giprostroymaterialy in the designs of newly built enterprises or those being modernized.

In the glass sector of the industry, work is being done on developing and introducing ASU TP for the production of the charge, glass making and glass firing, as well as enterprise control systems.

Thus, in 1975, the first ASU TP in domestic practice was introduced at the Lisichansk Glass Plant to control the charge dosage and the process of glassmaking on VVS machines. In 1979, at the same plant, a control system for glassmaking was introduced without using debiteuses. The Soyuzavtomatstroy Association is doing this work in close cooperation with the GIS [State Scientific Research Glass Institute] and Giprosteklo.

An automatic control system was developed and is being operated by the Borsk Glass Plant. It solves problems of organizational economic control. This system uses dialogue in a real time scale for the Borsk and Gomel' glass plants. Moreover, work is being done on creating ASU TP for the Tokmak and Riga glass plants and others.

To control complicated and large asbestos production, an ASU TP complex was created at the Kustanayazbest Combine, which includes the control of ore preparation and enrichment, loading and unloading ore and stages of the flow of loads; adjustment and coordination of the flow of material consumption meters; centralized monitoring and the calculation of technical-economic indicators.

There was a considerable amount of work done in automating the wall construction materials industry for enterprises. The production of products from autoclave hardening concrete was automated. Thus, the batching of binder components and the process of mixture preparation were automated at the Smorgon'silikatobeton Production Association and the Grodno Construction Materials Combine. Work was done on creating and introducing automatic control systems for producing silicate bricks. Work is being done on automating the production of clay bricks, etc.

Minicomputers produced by the Minpribor are used basically in solving ASU problems. This equipment provides basically for functioning in selected ASU TP modes, but has a number of essential shortcomings that reduce the quality of the process and equipment control. These include insufficient reliability, the necessity of implementing special conditions to maintain the equipment, compulsory preliminary adjustment and high servicing requirements. All this in addition to the high cost of computers requires further improvement and development of work on ASU TP to raise reliability, reduce operating costs, control problems in the area of material production, directed primarily toward economizing on fuel-power resources and increasing the productivity of labor.

In this connection, it is very important to use microprocessors most widely in systems for control, monitoring and regulating processes and the operation of technological equipment. The wide use of microprocessors in ASU and local control systems, as well as their use directly in technological equipment and monitoring-

measuring apparatus will create the necessary technocal basis for the mass use of reliable and economical automation systems in operation. The use of micriprocessors for control, as shown by domestic and foreign experience, will produce a real possibility for improving technical economic indicators at enterprises and in the sector as a whole. It should be kept in mind that automation costs will decrease because the cost of microprocessor sets are essentially lower than that of modern computers.

Even having the most perfect equipment, designed to be used for control, it cannot be affirmed that problems related to creating automation are defined and solved.

There exists an entire series of factors that determine the specific technical policy in the area of automation of processes and production facilities. An important factor here is that of optimal proportions and priority in selecting kinds and objects of automation. What we have in mind is a thorough preplanning study of the actual possibilities of introducing the available potential developments in automation, taking into account existing differences and nonumiformities in the enterprises of the sector. The criterion for selecting automation objects, establishing classification levels and functional completeness of the ASU TP and the priority of the work on various objects, must be the observance of economic and social interests, and the required level of the technical economic indicators in the operation of the enterprise and sector.

In connection with what has been stated above, it appears advisable in the coming years to implement the automation of technological processes and production facilities with the comprehensive automation of all newly built and modernized technological lines; create automated and automatic control means using microprocessors primarily, including specialized monitoring devices; study and create together with the Minstroydormash [Ministry of Construction Machinery] and Minpribor, control systems for automated machines and equipment with microcomputers; develop and introduce a series of new kinds of power saving control systems; create local automatic control lines with a broad span of technological processes at existing enterprises; developments for controlling multilevel control systems (ATK, IPK, IASU), including TEP and ASUP systems.

The successful realization of these activities in accelerating scientific technological progress will require the implementation of a number of measures and the solution of specific problems including the following:

planned preparation of enterprises for comprehensive mechanization and automation on the basis of creating modern kinds of equipment for basic and auxiliary producton;

mechanization of manual, hard and labor intensive work, train personnel to service and repair the equipment;

regularize supplies to enterprises that introduce new equipment, cables and devices;

remove limitation on using the modern component base for the ASU, devices and automation equipment, keeping in mind the necessity of meeting requirements for the input of new equipment of the highest category of quality.

Moreover, it is necessary to note that the wide introduction of microprocessor control systems is being held back by an insufficient selection of software and peripheral devices, as well as by the lack of service centers for such equipment.

These are, briefly, some problems in developing and increasing the efficiency of measures for automation, whose solution must be considered as an essential reserve in raising the production efficiency of construction materials.

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CONSTRUCTION METHODS AND MATERIALS

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DATA ON CORROSION DESTRUCTION

Moscow STROITEL'NYYE MATERIALY in Russian No 3, Mar 85 p 14

[Article by Ye. S. Lysenko, candidate of technical sciences, Uralniistromproyekt]

[Text] Work was done at the Uralniistromproyekt accounting for equipment subject to intensive destruction by corrosion. Data on corrosion destruction was obtained from enterprises and production associations that manufacture wall materials, ceramics, lime, gypsum. glass, sanitary wares and mineral wool products.

The basic reasons for short life of equipment or its individual units can be divided into three groups: 1 -- metal corrosion in aggressive media in rooms or at temperatures up to 120-150°C; 2 -- comprehensive action of alkali condensate, stressed condition, higher temperature and pressure; 3 -- unsatisfactory planning-design solutions.

Here, it is necessary to clarify that for individual positions, referred to in group 1, equipment destruction occurs not only due to insufficient corrosion resistance of the metal, but also due to the violation of technological and operating requirements. Such equipment includes, for example, drying cars and buildings made of structural metal.

In the construction materials industry, protection against equipment corrosion is being studied by the scientific research institutes of the sector. Recommendations have been developed on protecting drying cars from corrosion (Uralniistromproyekt), autoclaves (NIPIsilikatobeton), charge loaders (GIS) and transport conveyor line rollers for the production of ceramic tiles (NIIstroykeramika). Below special features of protection against corrosion of the indicated equipment are considered.

Corrosion of the metal parts of cars when being dried with flue gases occurs due to the action of sulfuric gases, forming sulfuric acid in a humid medium, as well as by the higher temperature, the oxygen in the air and other factors. The mechanism of the corrosion process is gaseous, while the nature of destruction is general. The corrosion depth indicator is 0.8mm/year.

To increase the life of drying cars to the norm, it is necessary to replace flue gases by pure air or protect metal structures by special coatings. Taking into account that changing the driers to brick construction would require considerable

capital investments, a question arises of selecting an acceptable protection method. Paints and varnishes, asphalt and organic silicon coatings used in recent years did not have the required protective capacity.

The Uralniistromproyekt proposed to protect the frame of the car from corrosion by electrical metallizing of an aluminum coating 200 to 300 micrometers thick with a following impregnation. The expected car life is 8 to 10 years.

The technology of applying protective coatings includes three basic steps: surface preparation by shot blasting to produce microroughness and cleaning; application of an aluminum coating by electric arc metallization; impregnation of metallized parts in a special solution.

Production capacities designed for the output of 4000 cars per year are being assimilated at the Ordzhonikidze Machine Repair Enterprises.

The operating conditions of autoclaves for heat-moisture treatment of silicate brick include complete interaction between an alkali medium (pH = 10-12), a complicated stressed state, a higher temperature (up to 187°C) and pressure (up to 12k force/cm^2).

More stressed is the lower part of the frame which is covered on the inside by the alkali condensate. As a result of the complete action of the alkali condensate and stresses, corrosion damages are developed (up to 1mm per year).

The problem of electrochemical protection for autoclaves was considered by the NIPIsilikatobeton Institute. The proposed cathode polarization of the autoclave housing consists of using an aluminum protector, which has a more negative potential in the condensate than the potential of the most negative anode component of the autoclave metal.

In the electroplating component of the solution, i.e., the corroding part is the aluminum protector when the autoclave housing is subjected to cathode polarization. The aluminum protector is installed between the rails of the autoclave. The protective device costs 150 to 500 rubles. Current costs with the protector are increased by 150 to 170 rubles per year. Specifications and instructions for using the protector were developed by the NIPIsilikatobeton Institute. Such protection was installed on 43 autoclaves and successfully passed receiving tests at the "Silikat" Production Association (Tallin). It is being introduced at a number of enterprises at the RSFSR Ministry of Construction Materials.

A charge loader is in use at glass plants for periodic feeding of glass-making furnaces with a charge and broken glass. The lip of the scoop is subjected periodically to a temperature of 950°C. The design specifies a lip made of brand SCh18-36 cast iron with water cooling. To protect the metal from the effect of temperature a shield made of steel and painted with aluminum paint is mounted on the scoop. In spite of the measures taken, the loaders are subjected to gaseous corrosion and become inoperable as a result of the burning and deformation of the lip frame and the protective shield.

The actual life of the lip is 6 months instead of 3 years. The problem of increasing the life of the loader was considered in the State Glass Institute, which

proposed the following to manufacturing plants (Arshinsk Glass Machinebuilding Plant and the Vyshnevolotsk Machine Plant): use ZhChKh-09 heat-resistant cast iron with water cooling manufacture of lip; use heat-resistant 12Kh18N10T steel, painted with heat-resistant aluminum paint to make the shield. It is expected that this will increase the life of the loader to 4 years.

Rollers of conveyor lines in the production of ceramic tiles are made of electrical welded pipe or seamless pipe 32 x 2.5mm in diameter and 1.2 to 2.3 meters long. Rollers made of KhN78T steel, operated at temperatures of 1000 to 1100°C do not last long enough (not over one year). The required life and actual life of rollers in low-temperature zones is not less than 2 years.

According to data of the Scientific Research Ferrous Metallurgy Institute imeni I. P. Bardin, industry manufactures pipe of two alloys, KhN78T8T and KhN45Yu, for long operation at temperatures higher than 1000°C. The sector institute NIIstroykeramika, together with the NIIChM, tested industrially and recommended for operation the KhN45Yu alloy for making rollers for automatic conveyor lines. This provides a reduction in oxidation at 1200°C of 1/1.5 to 1/? as compared to the KhN78T alloy. Special thermal treatment is necessary to reduce losses. Changing alloys to KhN45Yu reduces consumption of scarce nickel by 33 percent and increases its life to 2 years.

By eliminating from consideration equipment whose low service life is due to poor design solutions, it is possible to identify equipment that requires anticorrosion protection: autoclave car, shop equipment of glassmaking productions and ventilation systems of gas and flue pipes, and metal structures of buildings.

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CONSTRUCTION METHODS AND MATERIALS

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PRODUCTION OF CERAMIC BRICKS FROM ASHES OF ANGRENSKAYA GRES

Moscow STROITEL'NYYE MATERIALY in Russian No 3, Mar 85 pp 19-20

[Article by R. Sh. Valishev, R. M. Rayvich and F. I. Velikanova engineers, N. A. Akramova, candidate of technical sciences (NIIstromproyekt, Tashkent), F. Kh. Tadzhiyev, doctor of technical sciences (Tashkent Polytechnical Institute)]

[Text] In recent years, the volume of production of quality loess-rocks -- raw material for the production of ceramic bricks in Uzbekistan, -- has decreased considerably. At the same time, the use of ash tailings of thermal electrical power plants in the republic made it possible to replenish the raw materials base of the sector in the production of ceramic wall materials and free a considerable amount of valuable arable land from dumps, reduce air pollution which, as a whole, will have great national economic value.

The chemical composition of the Angrenskaya GRES ashes consists of basically oxides, silicon, aluminum, iron and calcium. The content of unburned carbon in the investigated ash is 2.35 percent. The fire resistance of ash is higher than 1400°C. Pure ash is an unplastic material; therefore, a plasticization additive, Aggrenskaya clay, is added to the investigated ash, whose selection was due to its proximity to the Angrenskaya GRES. The maximum ash content in the experimental masses was 70 percent.

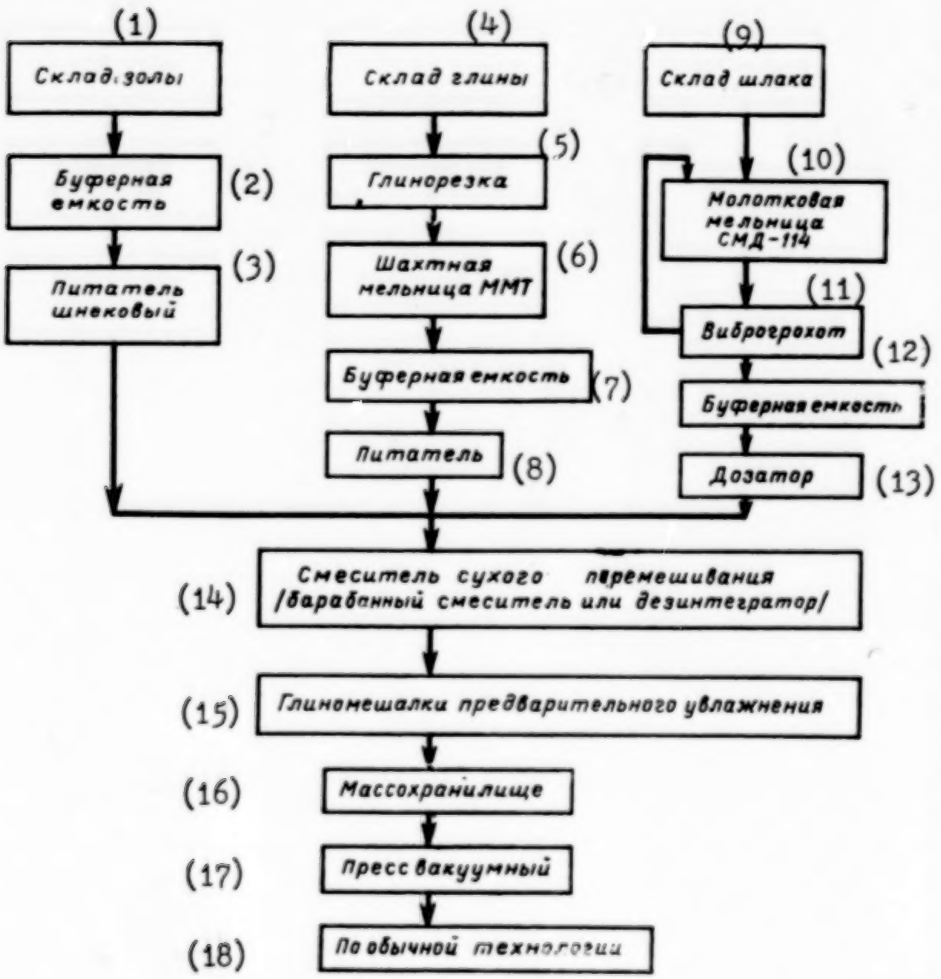
Laboratory specimens of ash-clay were roasted at 1050°C and 1100°C. Experimental specimens roasted at even 1100°C had insufficiently high mechanical strength -- 9.5 megaPa and water absorption -- 22.5 percent. The reason is the high refractoriness of the Angrenskaya kaoline-hydromacacious clay which did provide the necessary caking within the investigated temperatures.

To intensify the process of caking and reduce the temperature of roasting, slag from the Angrenskaya GRES was introduced into the experimental mass as a fluxing component. The fluxing properties of the slag are due to a considerable content of FeO -- 12.74 percent. Before introduction into the experimental masses under laboratory conditions, the slag was ground until full passage through mesh No 1. The amount of slag in the masses was 10 to 15 percent.

As shown by results of physio-mechanical tests of specimens obtained under laboratory conditions, the introduction of the slag at the roasting temperature of 30 to 50°C, increased the mechanical strength by 35 percent and reduced water absorption by 9 percent. Apparently, the ferrite component in the slag has the capacity to form

low-melting entactic alloys with the basic mass and thereby affect favorably the caking process of ash masses.

As a result of the studies, a mass was optimized using ash with an additive of the Angrenskaya clay of 30 to 40 percent and Angrenskaya GRES slag of 10 to 15 percent. An experimental lot of brick was made from the optimal composition mass under production conditions at the existing technological line of plant No 2 of the Almalyk Brick Plant Administration No 6.



Technological arrangement for brick production using ashes of Angrenskaya GRES.

Key on following page.

Key to previous diagram.

1. Ash warehouse
2. Buffer tank
3. Worm feeder
4. Clay warehouse
5. Clay cutting
6. MMT grinding pit
7. Buffer tank
8. Feeder
9. Slag warehouse
10. SMD-114 hammer mill
11. Vibrating screen
12. Buffer tank
13. Despenser
14. Dry mixer (drum mixer of disintegrator)
15. Clay mixer for preliminary humidification
16. Mass storage
17. Vacuum press
18. According to the usual technology

Table

Mass Composition %	Ultimate strength megaPa		Water absorption, %	Apparent density, kg/m^3	Frost Resistance, cycle	Brand
	on compression	on bending				
Experimental brick Ash-50 Clay-40 Slag-10	10.6	2.6	20.4	1510	15	100
Plant brick Loess-95 coal-5	1.55	1.85	23.2	1650	15	75

The bricks were formed on the SMK-28 vacuum press with a vacuum of 0.065 to 0.075 megaPa and rod humidity of 19 to 20 percent. The rod had four sides with smooth face surfaces. The bricks were dried in tunnel driers at 105 to 110°C. The scrap, in drying, did not exceed 1 percent. The ash bricks were baked in tunnel furnaces according to the plant mode: maximum baking temperature -- 1070°C; baking time -- 36 hours. Scrap after baking was 3 percent. The experimental brick had a light-rose color (see Table) which, according to classification by GOST 530-80, corresponds to brand 100.

To organize the production of the ash bricks (see figure) at existing brick plants, it is necessary to tie into the technological line the unit for the slag grinder and dispenser, the ash dispenser, the clay mixer of the preliminary humidification of the charge and the mass storage for aging and blending the mass. The unit on slag preparation includes the SMD-114 hammer mill, a buffer tank and a dispenser.

The Angrenskaya GRES has the possibility of organizing the separate recovery of ash and slag, so that no additional expenditures are required.

The introduction of ash brick production technology is envisioned for the newly built materials combine in the Novo-Angrenskaya GRES region.

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